ADOLESCENT HEALTH: TIME FOR A CHANGE

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COVARIATION AMONG HEALTH COMPROMISING BEHAVIORS IN ADOLESCENCE

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Covariation among Health Compromising Behaviors in Adolescence

EXECUTIVE SUMMARY

As studies of the health problems of adolescents have proliferated in recent years, many researchers have reported that a substantial number of health compromising behaviors covary with one another. This background paper is intended to give an overview of our current knowledge about such covariation and its relevance to service delivery.

For the most part, the findings concerning covariation among health compromising behaviors in adolescence are quite consistent. There is a subset of behaviors that are strongly related to one another. This group includes smoking tobacco, consuming alcohol, using marijuana, using other illicit drugs, juvenile delinquency, and sexual intercourse. The other health compromising behaviors also covary with behaviors in this group to varying degrees. School performance, problem behavior at school, and risk-taking all are moderately to strongly associated with this group. Unprotected sexual behavior and parenthood and mental health problems are more weakly associated with each other and with the strongly related subset of behaviors. This general pattern of relationships appears to hold across time as well as concurrently, and the across-time relationships largely are attributable to the stability of the individual behaviors and the stability of individual differences in a general tendency toward such behavior.

On the whole, the level of covariation among health compromising behaviors does not appear to be substantially related to age, sex, and ethnicity. More systematic research on this issue would be required to reach a more definitive conclusion.

It has been widely discussed that many of these health compromising behaviors may comprise a syndrome of problem behavior. From our review it is

clear 1) that a single set of explanatory factors might well account for a great deal of the variability in each of the strongly related subset of health compromising behaviors, but also 2) that there are equally important unique features of each behavior that require separate explanations. In other words, various problem behaviors have much in common and the presence of any one increases the odds of others. On the other hand, there is much that is distinct about each of the behaviors and we cannot expect them all to arrive in a single package.

A few studies have addressed the sequence in which health compromising behaviors appear in adolescence. The thrust of these findings is that more serious forms of substance abuse are unlikely to occur without the previous appearance of the forms that are less serious and more common. The typical sequence combining substance use and delinquency is minor delinquency, followed by alcohol use, serious delinquency and/or mental health problems, marijuana use, and use of other illicit drugs. It is important to note, however, that these sequences are far from inevitable. Large proportions (usually the majority) of the adolescents who engage in any behavior early in the sequence do not go on to the later stages. To a large extent, the sequence of behaviors is dictated by the typical age of onset of the behaviors and their prevalence or base rate in the population.

Relatively little has been written in explicit attempts to explain relations among behaviors of this sort. There would seem to be two features that the strongly related subset of behaviors have in common, and which could therefore serve as the basis of general explanations for covariation among health compromising behaviors in adolescence. One feature shared by these behaviors is that all are violations of social norms as to what conduct is appropriate for adolescents, that is, they are deviant behavior. Theories of deviance provide an appealing starting point for explaining covariation among health compromising behaviors in adolescence because they place this phenomenon in the context of a broad net of social influences and personal predispositions. Another feature of all of these behaviors is that they involve taking risks. Explanations based on the concept of risk-taking have the advantage of relating these behaviors to normal developmental needs such as autonomy, mastery, and intimacy.

There are several ways in which health services might be improved by capitalizing on the fact that health compromising behaviors tend to covary. Knowledge about covariation could be used for a broad range of purposes such as individual diagnosis, setting admissions criteria for treatment programs, chosing locations for clinics with special services for high risk populations, designing coordinated services for a variety of different problems, and targeting resources for prevention and health education programs.

In applying knowledge about covariation among health compromising behaviors to these purposes, it is important to be cognizant of the actual strength of the relationships among the behaviors. The health compromising behaviors we have designated as "strongly related" are indeed associated at a very high level by the standards of social science and public health research. Even so, these relationships are far short of perfect. Also, because the base rate of serious levels of each behavior are relatively low, the overlap among even strongly related behaviors will be distinctly limited.

These limitations on the degree of overlap among behaviors would argue against specifically targeting substantial resources on "high risk" or "multi-problem" youths who simultaneously have a large number of problems. Setting program eligibility criteria in terms of minimal levels of several simultaneous problems is more likely to exclude deserving clients than to concentrate services on especially needy ones. It is likely that more good would be accomplished by coordinating the delivery of services for different types of problems.

A final implication for health services is that theoretical explanations of covariation among health compromising behaviors may prove a useful guide for designing services and prevention programs that would simultaneously address a large group of behaviors. A substantial share of the variation in each of the strongly related subset of behaviors is attributable to a general tendency to engage in problem behavior. Theories of deviance suggest that such a general willingness to violate conventional norms could be addressed by steps such as 1) strengthening social bonds to parents, teachers, and other conventional adults; 2) enhancing opportunities for success, particularly among adolescents who are poorly prepared for school; 3) enhancing parental skills for fair and consistent supervision and discipline; and 4) minimizing association with deviant peer groups. Explaining health compromising behavior as instances of risk-taking reminds us that such behavior is, in some senses, a manifestation of normal and positive developmental processes. Therefore, treatment and prevention should not attempt to stop all risk-taking, but rather to channel the expression of developmental needs such as autonomy, mastery, and intimacy into forms that do not pose a serious danger to health and future life chances.

Covariation among Health Compromising Behaviors in Adolescence

As studies of the health problems of adolescents have proliferated in recent years, many researchers have reported that a substantial number of health compromising behaviors covary with one another. For instance, Donovan and Jessor (1985) reported that youths who were precociously sexually active also were more likely to consume alcohol to excess, use illicit drugs, and engage in juvenile delinquency. Though the research literatures on various health compromising behaviors tend to be distinct, researchers studying one issue (such as teenagers' use of marijuana) commonly collect data about at least a few other issues (such as their use of tobacco and alcohol and their mental health) at the same time. Therefore, there are many published reports that include findings about covariation. Yet it is only recently that the relationship among health compromising behaviors has received concerted attention in its own right (e.g., Donovan and Jessor, 1985; Elliott, Huizinga, and Menard, 1989; Kandel, 1975; Osgood, Johnston, O'Malley, and Bachman, 1988; Robins and Ratcliff, 1980a).

These research findings mirror the common experience of people who treat the health problems of adolescents: Youths obtaining treatment for one problem are likely to have others as well. Covariation among health compromising behaviors potentially has great relevance to policy. If certain problems occur together with sufficient regularity, then the delivery of services for those problems should be coordinated to increase their efficiency and quality and to reduce redundancy in services. Consider, for example, a teenager who is on probation for burglary and also has a drug abuse problem. Poor coordination of services could mean this teenager either fails to receive drug treatment because probation does not provide that service, or resources are squandered because he or she simultaneously receives drug treatment from the probation officer and other sources such as mental health, social services, and medical agencies. Knowledge about covariation among health compromising behaviors may also help us to select target populations for prevention and treatment efforts. For instance, cigarette smoking among 10- to 13-year olds may be important to long term health not only because of the direct consequences of tobacco use, but also because of the increased likelihood that these youths will engage in other dangerous activities such as heavy drinking and dangerous driving. Furthermore, covariation among health compromising behaviors is of practical importance because it suggests that there are causal factors that are simultaneously the source of a variety of behaviors. If those factors can be identified, then treatment that addresses them should prove particularly effective.

This background paper is intended to give an overview of our current knowledge about covariation among health compromising behaviors in adolescence and about the relevance of this covariation to service delivery. Though the paper reviews a long list of studies, there undoubtedly are many others that have been missed. This is an unavoidable consequence of the relevant research being scattered among the largely distinct literatures for each behavior (e.g., alcohol use, suicide), each of which may be divided among several academic disciplines (e.g., public health, sociology, psychology). Fortunately, the principal findings are quite consistent. The major limitation is that there is much less information about some behaviors than others.

In addition to reviewing these findings, the major concern of the paper is their interpretation. The specific policy implications of covariation among health compromising behaviors depends in large part on the strength of the relationship between the behaviors. Covariation is never so strong that one behavior is always associated with another, but rather that one is more likely given the presence of the other. If the relationship is merely somewhat stronger than chance, then policies that focus on "multiple problem youth" would fail to serve most of the adolescents in need. The paper will emphasize some methodological concerns that are particularly pertinent to understanding the implications of the findings. We will also consider what theoretical interpretations are most consistent with the findings. We will not, however, attempt to identify which variables are simultaneously causes or correlates of several of the health compromising behaviors. This would entail the enormous task of reviewing the separate research literatures for each behavior, which goes far beyond the scope of the present paper. A brief section of the paper suggests directions that are promising for future research. Our overarching aim is to determine what substantive conclusions and policy implications are prudently justified at this time.

The Health Compromising Behaviors Considered in This Paper

The primary emphasis of this paper will be on behaviors or activities that constitute a significant risk to health. Thus, our focus is less directly on health problems themselves than on health compromising behaviors. It is more productive to focus on health problems in the form of behaviors than on diseases and other medical outcomes for several reasons. First, as Jessor (1984) argues, the primary causes of death and disability during the adolescent years are behavioral, as are the long term health risks that can be traced to this period. Second, covariation among health compromising behaviors is problematic for the treatment system in a way that covariation among illnesses is not. The modern hospital and clinic system is well equipped to address a variety of physical ailments simultaneously. On the other hand, treatment directed at health compromising behaviors, such as illicit drug use and juvenile delinquency, is spread among a set of poorly coordinated service systems. Furthermore, the similarities and differences in treatment practices for such behaviors can be hard to define.

A focus on health compromising behaviors also is useful because there is a large body of research about covariation among them. Indeed, there are conceptual similarities among many of these behaviors that would lead us to anticipate a substantial level of covariation. Furthermore, health compromising behaviors such as smoking tobacco, excessive alcohol consumption, and precocious sexual behavior each contributes to a variety of medical problems. Thus, covariation among health compromising behaviors can have extensive ramifications for covariation among physical ailments.

The list of health compromising behaviors with which we will be concerned was largely shaped by the available research literature.[1] Fortunately, those behaviors that have been of greatest public concern also receive considerable attention from the research community. Several of the behaviors fall into the general category of substance abuse: smoking tobacco, alcohol consumption, and illicit drug use. Juvenile delinquency is another type of health compromising behavior with which we will be concerned.[2] Adolescence is the period of the highest rates of illegal behavior and also the period of the highest rates of victimization. Not only does delinquency present a health problem for adolescent victims, but it also is associated with a wide variety of negative consequences for the later lives of offenders (Robins, 1966). Adolescent sexual behavior is another important source of health problems for adolescents. We will consider adolescent sexuality in terms of precocious sexual intercourse, sexual intercourse that is unprotected (against pregnancy or disease), and adolescent pregnancy.

Another very relevant, though less studied, category of health compromising behaviors is risk-taking or thrill-seeking activities such as dangerous driving and dare-devil behavior. The inclusion of risk-taking is justified less by the available

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1. In the interest of brevity, this paper will not attempt to document the connections of the health compromising behaviors to specific medical problems. Jessor (1983, p. 73) delineates a large variety of paths by which risky behaviors during adolescence can have an immediate or long-term impact on health. Though the health dangers associated with these behaviors vary considerably, the reader can assume that in each case there is ample evidence that the behavior is a risk to one's health.

2. Of course, several of the other health compromising behaviors are themselves illegal for adolescents (such as most forms of substance abuse), so they can properly be termed juvenile delinquency as well. Our discussion of delinquency will emphasize assaults, property offenses, and forms of public disorder, none of which would be categorized under the other health compromising behaviors we will consider.

research, of which there is little, than by the prominence of the concept in discussions of covariation among health compromising behaviors. We would be most interested in behavior that is intentionally risk-seeking, such as rock climbing without safety precautions. Unfortunately, there was almost no research concerning covariation of such activities with other health compromising behaviors. Therefore, this category includes behavior in which people knowingly risk their health (whether intentionally or not) and that does not fit our other categories of health compromising behavior. These studies were largely limited to dangerous driving and failure to use seatbelts. We limited the review to studies of behavior, excluding studies of risk-taking or sensation seeking as personality attributes (e.g., Zuckerman, 1979).

There are two types of school problems we will consider: school failure (including drop-out) and misconduct at school. Unlike the other health compromising behaviors, school failure is not a specific activity, but rather a status partly determined by ongoing patterns of behavior and partly determined by prior opportunities and abilities. Nevertheless, academic success is so relevant to future life prospects which are tied to health that it would be remiss to exclude it.

The final category of health compromising behavior included in our review is suicide.[3] Because, there is only limited research available on suicide, we have used a relatively broad definition, including not only completed suicide but also suicide attempts and suicidal ideation.

We will also consider one type of health problem not readily classified as a health compromising behavior, namely, mental health problems. Our consideration of these problems is limited, however. A thorough examination would require a review of the very large and diverse set of standard diagnostic categories (DSM-

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[3] We had planned to include both suicide and eating disorders in our review as two types of behavior that directly injure oneself. We were unable include eating disorders because we could not locate sufficient research on the relationship of this behavior to other health compromising behaviors.

IIIR, American Psychiatric Association, 1987). In fact, these categories are poorly suited to our aims. Many of the diagnoses are defined as mutually exclusive, which would preclude covariation among them. An even greater problem is that health compromising behaviors often appear in the lists of symptoms that define the categories. The diagnostic category of "conduct disorder" provides an extreme example. It is simply not meaningful to ask whether juvenile delinquency is associated with this diagnosis because all of the fourteen symptoms that define it are delinquent acts. In other instances health compromising behaviors such as suicide attempts or drug abuse are symptoms that would contribute to making one particular diagnosis rather than another. Thus, empirical associations between the diagnostic categories and the health compromising behaviors generally would be uninformative or misleading. Therefore, we will limit our attention to research on conceptually distinct dimensions of mental health such as anxiety and depression, which are widely studied variables that cut across a variety of diagnostic categories.

It is also interesting to consider the relationship between health compromising behaviors and their opposite, health promoting behaviors. Indeed, our review includes failing to use seatbelts and contraceptives, cases for which the health compromising behavior is actually a failure to engage in health promoting behavior. Research on covariation between the two types of behavior is not common, but there are some recent studies of the topic. After our review of covariation among health compromising behaviors, we will briefly summarize some of those findings.

A SUMMARY OF THE EVIDENCE ABOUT COVARIATION AMONG HEALTH COMPROMISING BEHAVIORS IN ADOLESCENCE

As was noted above, this background paper is not offered as a definitive review of all pertinent research. Nevertheless, we have located a substantial body of relevant work, and the basic findings are consistent enough that a great deal can be said. Furthermore, the paper will review certain methodological and conceptual considerations that have important implications for interpreting findings that transcend any particular study.

The summary of findings is divided into two sections, the first concerning concurrent or cross-sectional relationships among the health compromising behaviors and the second concerning relationships over time. An example of a concurrent relationship would be the extent to which youths who have used marijuana during the past year also are more likely to have engaged in unprotected sexual intercourse during that same period. Data collected at several points in time present the possibility of determining various types of longitudinal relationships. The researcher may examine the sequence of health compromising behaviors, considering which are most likely to occur first and whether particular progressions of behaviors are especially common. Adding the time dimension also allows the researcher to assess predictive relationships: How much are the chances of illicit drug use at age 16 increased if a child has begun smoking cigarettes by age 11?

Relationships across time also raise the possibility of determining causal influences among the health compromising behaviors. Here we go beyond merely asking whether the appearance of one behavior helps forecast the occurrence of another to ask whether the first actually leads to the second. Though such causal relationships typically are of primary importance to social scientists, they are not prominent in research on covariation among the health compromising behaviors in adolescence. Few studies have attempted to ascertain such influences between these behaviors, and researchers typically explain the relationships among the variables in terms of other factors thought to lead to multiple problem behaviors. We will consider the problems involved in assessing influence between behaviors in a later section of the paper. In the review that follows, the reader should assume that no causal inferences are suggested (either by the present author or by the original researchers) unless it is explicitly stated otherwise.

Most studies of covariation among health compromising behaviors are based on data collected at a single time, so they report only concurrent relationships. Though there are many questions such studies cannot answer, the information they provide is quite useful. They will allow us to determine which health compromising behaviors do and do not covary and to judge the strength of these relationships. In all likelihood, these are the facts about covariation that will be of greatest practical importance. They provide the basic information needed to assess the extent of overlap of populations with different problems. Furthermore, longitudinal research to date indicates that across-time relationships are largely predictable from concurrent relationships and age trends.

There is far less research about longitudinal relationships for us to report. The implications of such studies are more complex, so we will discuss some of them in more detail, particularly with regard to methodological issues.

Concurrent Relationships between Health Compromising Behaviors

There are three types of issues that can be addressed on the basis of concurrent relationships between health compromising behaviors.[4] The first is, which of the behaviors are positively correlated with each other? After answering this question by reviewing these relationships, one pair of behaviors at a time, we will consider the relative strengths of the relationships between different pairs. In this way we will determine whether there are distinct clusters of behaviors or a largely undifferentiated mass of related behaviors. In the final section on concurrent relationships we will evaluate the absolute strength of the relationships. Studies with large samples have the statistical power to detect even very weak associations. The actual magnitude of the relationships is critical to the policy implications of the findings. For instance, there would be a stronger case for integrating treatment for drug abuse into the juvenile justice system if almost all delinquents were drug abusers than if there were only a slightly higher rate of drug abuse among delinquents than among non-delinquents.

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[4] By concurrent we mean that the different health compromising behaviors are measured at the same time and preferably (though not necessarily) with reference to the same time period. Our review will not include research about whether youths engage in different health compromising behaviors at the same moment. Interesting research has been done on topics such as driving (Jessor et al., 1989) committing delinquent offenses (Elliott et al., 1989) and failing to use condoms (Hingson, et al., 1990) while intoxicated. Though this is a related problem, it is tangential to our primary concern with the extent to which the youths who engage in one health compromising behavior are the same youths who engage in others.

Methodological Issues

Our summary emphasizes the results from studies of general populations (preferably drawn randomly from the nation or from a substantial region) rather than clinical samples from treatment agencies such as health clinics, adolescent psychiatric units, drug treatment programs, or detention centers. Because clinical samples will necessarily have very high rates of one or more health compromising behaviors, they are likely to distort seriously the degree of relationship between behaviors. For instance, consider a study comparing a group of adolescents from an in-patient drug treatment program with a group of adolescents in the same hospital for surgery. Because of the overrepresentation of drug abusers in such a study, the results could easily indicate that the vast majority of sexually active teenagers are drug abusers when this was not at all true of teenagers in general.[5] Therefore, we will report results of clinical studies only when other studies are not available, and we will not place as much weight on those findings.

A difficulty in comparing studies is that there is little consistency in the measurement of the health compromising behaviors. One study may measure marijuana use in terms of the number of occasions used in the last year, while another dichotomizes the sample into current daily users versus everyone else, and still another compares people who have ever used marijuana in their entire lifetimes with those who have not. Often a single study will use different time periods and frequency categorizations in measuring different health compromising behaviors. Therefore, the studies of "concurrent" relationships concern behaviors that are measured at the same time, but may or may not have occurred at the same time. As we shall see below, findings about which health compromising behaviors are related appear largely to be unaffected by these differences in measurements. These variations considerably complicate the assessment of the strength of relationships, however, which we will discuss in greater detail below.

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[5] Of course, knowledge about covariation within a clinical sample would be of great practical value when designing programs for comparable clinical populations. Unfortunately, the characteristics of clinical populations are quite variable from setting to setting, depending greatly on such factors as the primary presenting problem and dominant local referral sources.

Another important methodological issue is that virtually all of the studies we report assess health compromising behaviors through self-reports of the adolescents obtained in interviews or self-administered questionnaires. Though there is considerable evidence supporting the reliability and validity of such measures, it would be preferable to cross-validate the findings with other methods. Unfortunately, there are enormous practical difficulties in gathering alternative measures for several of these behaviors in the same sample.[6]

Whenever possible, we will report findings about covariation separately by age, sex, and race. With the possible exception of sex differences, it is clear that researchers are much less likely to report group differences in covariation than to report group differences in the rates of the behaviors themselves. The information that is available, however, indicates that covariation is relatively consistent across groups, even when the behavior is more common in one group than another.

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[6] Alternative measures exist for each of these problems. Unfortunately, these measures are either intrusive (e.g., blood and urine tests for substance use), expensive (e.g., direct observation and clinical evaluation), or extremely insensitive (e.g., institutional and clinical records). Consider institutional and clinical records in particular. A researcher can search justice system records of arrests to determine which members of a sample engage in juvenile delinquency. Even if the reports are accurate and the operation of the justice system is free from bias, well over 90% of illegal acts never lead to arrests (e.g., Osgood, O'Malley, Bachman, and Johnston, 1989). Such a measure would severely underestimate the degree of relationship between delinquency and other problems. The voluminous records kept by many social service agencies also are of little help. If the record for a given youth gives no indication of illicit drug use, is that because the youth does not use drugs or because the caseworker does not know?

Which Health Compromising Behaviors Covary with One Another?

This section is based on a set of studies too numerous to review one by one, so here we will only summarize them. Appendix A contains the specific findings on which the summary is based, organized in the order of this presentation. The findings do not lend themselves to further numerical summary because different studies report different statistics, and rarely do the reports provide sufficient information to translate one type of statistic (e.g., group means) to another (e.g., correlation coefficients). Appendix B contains basic information about each study, including the size and nature of the sample, and brief characterizations of the measures.

Relations Among Types of Substance Use

Virtually without exception, all studies that have examined the relationships among various forms of substance abuse have found that people who use one commonly abused substance are more likely to use others as well. The positive correlation between smoking tobacco and drinking alcohol has been established with five studies, several of which are based on random probability samples of the entire U.S. or of particular states. The relationship was stronger for females than for males in the studies that reported results separately. There is also abundant evidence (from six studies) that tobacco consumption is associated with the use of marijuana. Two studies found that the relationship was stronger for females than males, but another found no difference. The relationship between smoking tobacco and use of illicit drugs[7] other than marijuana was addressed in five studies, and once again each found a positive association between the two. Most of the studies measured use of other illicit drugs through a single index combining use of any of a variety of drugs. One reported results separately for 11 different drugs, and the relationship held for all of them. Tobacco use and use of illicit drugs other than marijuana were related more strongly for females than for males in one report, but the difference was minimal in the findings of another.

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[7] By illicit drugs we mean drugs that are illegal for both children and adults, rather than substances such as alcohol and tobacco which are illegal only for those below a certain age.

There is also ample evidence that adolescents who consume alcoholic beverages are more likely than others to use marijuana and other illicit drugs. Nine studies reported the association for alcohol and marijuana, and six studies reported the association for alcohol and other illicit drugs. In every case, the adolescents who consumed alcohol were also more likely to use marijuana and other illicit drugs (and vice versa). There were no consistent differences between the sexes in the strength of this relationship. Potvin and Lee (1980) looked at the relationship of alcohol to marijuana use and use of other illicit drugs for age groups of 13-14, 15-16, and 17-18, and they found that the strength of the relationship was roughly the same for each age level.

Finally, there is also substantial evidence of positive correlations among the use of various illicit drugs. Six studies have established that adolescents who use marijuana are more likely to use other illicit drugs. This relationship does not appear to differ by sex or by age during adolescence. Two studies also report correlations among a number of specific illicit drugs other than marijuana. In all cases, use of the different drugs is positively and significantly related.

Substance Use and Other Health Compromising Behaviors

Substance use and juvenile delinquency. There is also abundant evidence about the relationship of juvenile delinquency to various forms of substance use. Again the findings clearly indicate that there is a positive association: Youths who use any of the substances are more likely to engage in delinquency, and youths who engage in delinquency are more likely to use any of the substances. This is true of smoking tobacco (four studies), drinking alcohol (six studies), using marijuana (6 studies), and using other illicit drugs (three studies). All of these studies are based on large and broad based samples.

None of these studies differentiate age groups in reporting results, but a number provide separate estimates for males and females. Tobacco use related more strongly to delinquency for females than for males, which parallels the findings for tobacco in relation to some of the other forms of substance use. There is no clear pattern to sex differences in relationship of delinquency to alcohol or illicit drug use. The association was sometimes stronger for males and sometimes for females.

Substance abuse and adolescent sexuality. There is somewhat less evidence available about the relationship between substance abuse and health issues involving adolescent sexuality. Undoubtedly more information will become available through the intensive research surrounding the transmission of AIDS, for which drug use, sexual behavior, and contraceptive use are critical.

Seven studies have addressed whether adolescents who use proscribed substances are more likely to be sexually active. Though many of these studies are based on local samples, together they provide convincing evidence of a positive correlation. There were many instances of significant relationships between substance use and sexual behavior, and only two cases where the relationship was not significant: females in Malcolm and Shephard's (1978) sample and females in one of Donovan and Jessor's (1985) samples. In both of these instances, however, the samples were small (58 and 141 respondents), the relationship was still positive, and significant relationships were found for other groups in the same study.

There were no sex differences in the strength of the relationship that were consistent across these studies. Zabin et al. (1986) reported separate results for Blacks and Whites, and their findings suggest a trend toward a stronger relationship for Whites than Blacks.

Only three studies are relevant to the relationship between substance use and unprotected intercourse or sexually transmitted disease, but all indicate that these sexually related health problems are more common among adolescents who use proscribed substances. These results do suggest, however, that unprotected intercourse is less related to substance abuse than is sexual intercourse per se.

The findings relating substance use to adolescent parenthood and pregnancy are less consistent, roughly evenly divided between significant positive associations and statistically insignificant relationships. Reviewing the specific findings (which can be found in Appendix A), one can see that the strength of the relationships are relatively similar across the studies. Whether or not significant, the two outcomes generally have weak positive relationships (odds ratios in the range of 1.25 to 1.90). The only instances in which one of these problems is (insignificantly) associated with a lower rate of the other is certain cases in Elster et al.'s (in press) study, and those instances may well reflect responses to pregnancy. In some studies substance use is associated with pregnancy or parenthood for one group, but not for another (e.g, males vs. females, blacks vs. whites). It is not clear whether these differences reflect genuine differences between the groups, or they are merely chance results due to the generally weak and somewhat variable relationships.

Substance use and risk-taking. We located four studies that examined the relationship between substance use and risk-taking, all of which focus on risks concerning the automobile (dangerous driving and failure to use seatbelts). Though these studies provide a limited range of measures of risk-taking, they consistently indicate that greater risk-taking coincides with higher rates of substance use, including use of tobacco, alcohol, marijuana, and other illicit drugs. Once again, sex differences in the strength of the relationship were inconsistent across studies and across substances.

Substance use and the school. There is a great deal of evidence that students who use proscribed substances perform more poorly at school. Four studies report this relationship for tobacco use, seven for alcohol use, six for marijuana use, and three for the use of other illicit drugs. In all cases, there was a negative relationship between use of any of these substances and school performance, as indexed by grades. In the one study addressing drop-out and substance use, drop-out was associated with higher rates of use for all substances except alcohol (and cocaine use for females only, and for the past year only).

Two studies with large probability samples have examined the relationship of substance use to one or more problem behaviors relating to the school. One found that truancy was associated with use of any of several substances, and the other found that misconduct at school was associated with alcohol consumption. The later finding held for males and females and for Whites, Blacks, Hispanics, and West Indians.

Substance use and suicide. We located four studies that examined this issue, two of which involved very limited clinical samples. The measures relating to suicide in the two stronger studies are limited to suicidal ideation. In one of those two, suicidal ideation was related to substance use for both males and females, but in the other the relationship held only for females. The two weaker studies reported that substance abuse was associated with completed suicides and with certain characteristics of suicide attempts. Given the problems of these studies, and the limited measures of the other studies, we must regard the findings as merely suggestive that substance use is associated with these various aspects of suicide attempts.

Substance use and mental health. A number of researchers studying large general population samples have reported about the relationship between substance use and mental health, and the findings are mixed. While there are many instances in which substance use was associated with a greater incidence of mental health problems, there are almost as many others in which the relationship did not reach statistical significance. This does not necessarily reflect substantial inconsistency among the studies. As a review of the relevant portion of Appendix A reveals, almost all of the findings reflect weak positive associations between substance use and mental health problems, whether or not the findings are statistically significant.

In two cases the relationships are relatively strong. Fejer and Smart (1972) found a more substantial relationship between illicit drug use and receiving psychological treatment (odds ratios of 3.8 and 4.9). It seems likely that this result is attributable to treatment for the substance use itself rather than for distinct mental health problems. Stiffman et al. (1987) also found relatively strong relationships in some instances (odds ratios of 4.4 and 5.7), perhaps because their measures separate substance abuse from less frequent and serious use, which other researchers did not.

The relationship between substance use and mental health problems does not appear to vary systematically by sex and age. The only study that separated ethnic groups found a significant relationship for Whites but not for Blacks and Puerto Ricans (Paton and Kandel, 1978).

Juvenile Delinquency and Other Health Compromising Behaviors in Adolescence

Juvenile delinquency and adolescent sexuality. The five studies we located that have addressed the issue have consistently found that adolescents who are sexually active also have higher rates of involvement in delinquent activities. The relationship between delinquency and engaging in sexual intercourse held for both males and females, and it was of roughly the same magnitude for both sexes.

An additional three studies examined the relationship between delinquency and being or becoming a parent. This is a rather small base from which to generalize, and in two of the studies the timing of parenthood in relation to the assessment of delinquency is unclear. While most of the specific results showed a significant relationship, many do not. The overall pattern of the results, both those that were statistically significant and those that were not, supports the conclusion that there is a modest positive correlation between delinquency and early parenthood. There is also some indication that the relationship may be stronger for white males than for black males and for males in general than for females (though the later could reflect a response to parenthood rather than a precursor.)

Juvenile delinquency and risk-taking. Two studies found that delinquency was associated with high rates of dangerous driving and that the two behaviors were more strongly related for males than for females.

Juvenile delinquency and the school. Four of the studies included in our review demonstrate that engaging in delinquent behavior tends to coincide with having poorer grades at school. This is part of a general pattern of relationship between delinquency and school problems that is well documented in standard texts on delinquency (e.g., Jensen and Rojek, 1980; Thornton, Voigt, and Doerner, 1987). Delinquency has been shown to be associated with intelligence, learning disabilities, attitudes towards teachers and school, low aspirations, misbehavior at school, and truancy.

Juvenile delinquency and suicide attempts. We located only two studies that investigated the relationship between delinquency and suicide attempts. Both of these studies have serious weaknesses, and the results are quite contradictory. Thus, we do not have an adequate basis for any meaningful conclusions.

Juvenile delinquency and mental health. In a sense, juvenile delinquency is by definition related to mental health because illegal behavior is a part of a number of specific psychiatric diagnoses for both adults and children. For present purposes, however, we are interested in whether delinquency tends to be associated with other mental health difficulties. While there is a great deal of research assessing the personality characteristics and psychological adjustment of delinquents, those studies tend not to be very useful in this regard. Most of this research has taken the goal of differentiating types of delinquents rather than comparing delinquents with non-delinquents (see reviews by Gold and Petronio, 1980 and Thornton et al., 1987). Thornton et al. (1987) concluded that despite this research emphasis on emotional disturbance among delinquents, most delinquents are psychiatrically normal. Even if most are normal, however, it is still possible that delinquents would have a somewhat higher rate of mental health problems than the rest of the adolescent population. This issue is addressed more directly by Elliott et al. (1989) who studied a national probability sample of adolescents in the United States. They found that involvement in delinquency was associated with a higher rate of mental health problems, more depression, and greater use of mental health services.

Adolescent Sexuality and Other Health Compromising Behaviors in Adolescence

Adolescent sexuality and risk-taking. The only study we located which related adolescent sexuality to risk-taking was Jessor's (1987) study of risky driving. He reported that males who took more risks in their driving were more likely to have experienced sexual intercourse, but this was not true of females. Males and females who were risky-drivers also tended not to use contraceptives, though this relationship was of marginal statistical significance ($p < .10$). Contraceptive use could only be assessed for sexually active adolescents, so this finding was based on rather small samples of 82 males and 109 females.

Adolescent sexuality and the school. Various studies link poor grades, dropping out of school, and problem behavior at school with early intercourse, unprotected intercourse, and pregnancy. Though there may be only one or two studies on each of the possible relationships, the pattern is quite consistent. Sex differences in the strength of the relationship are not consistent across studies, and the only study reporting ethnic differences found early fatherhood to be less related to school suspension for Blacks and Hispanics than for Non-Black, Non-Hispanic youth (Elster et al., 1987).

Relationships Between Other Pairs of Health Compromising Behaviors

Risk-taking, suicide attempts, and mental health tended to be least studied in relation to other health compromising behaviors. We located little or no research about most pairings of these behaviors with each other or with adolescent sexuality or school problems. We hasten to add that studies on many of these combinations of behaviors quite likely exist, but they were not to be found in the literatures on adolescent health and adolescent deviance.

A single study examined risk-taking (in the form of failure to use seat belts) and poor school performance, and it found a significant relationship. The relationship between school performance and suicidal ideation proved significant for females but not for males in the one study that reported findings on that topic. A third study reported that poor school performance was associated with poorer mental health in terms of general psychological adjustment and psychosomatic illness.

Three studies investigated the relationship between suicide and mental health problems, and all found strong relationships. Of course, mental health is a central topic in the more general literature on suicide among adults. In his major review of that field, Lester (1983) concluded that suicidal individuals are in general psychiatrically disturbed and that completed suicide is more common among people with affective disorders. Depression, particularly the aspect of hopelessness, is the strongest correlate. Thus, the literature for adults supports the more limited findings for adolescents.

Lester's review of research on correlates of suicidal behavior among adults also bears on another topic of interest here. He reported that results are mixed as to whether adults who take risks such as gambling and dangerous driving are more or less likely to engage in suicidal behavior.

Summary of Which Health Compromising Covary with One Another

The basic findings from the above review can be summarized quite simply: Adolescents who engage in any one health compromising behavior are more likely to engage in almost any other. This held true for almost all combinations of substance use, delinquency, problems involving sexuality, school problems, and mental health problems. There were no instances of definitive findings that any pair of behaviors was negatively related or even unrelated.

One type of exception to the pattern was a few instances for which results were inconsistent, with some studies indicating significant relationships while others did not. This occurred for both substance use and delinquency in relation to contraception or parenthood, for substance use in relation to mental health, and for risk-taking and sexual behavior.

The other type of exception is that there is much more research and much better research about some behaviors than others. There are far fewer studies of risk-taking, suicide, and mental health in relation to other health compromising behaviors, and those studies that are available rarely used large probability samples. We have almost no information about the relationships among these behaviors or their relationships with problems involving sexuality or with school problems.

The available research literature is not very informative about group differences in covariation among health compromising behaviors in adolescence. Only a handful of studies reported the level of covariation separately for different age levels. We found no instance of substantial difference between age levels in the strength of relationship. Those that did found very little difference in the level of covariation. Most of the studies were based on high school aged samples or mixed samples of junior high school and high school aged adolescents. Almost none of the studies yielded separate analyses for adolescents younger than age 15.

Somewhat more of the studies reported results separately for different ethnic groups. While results generally were similar for across groups, there were also some instances of differences that appear to be substantial. Unfortunately, few (if any) of the studies reported significance tests of differences in relationships (i.e., statistical interactions), and none of these findings have been replicated in separate samples. The typical study was based on a sample that was largely or exclusively White. Nevertheless, there were also a good number of studies with substantial minority group representation, and most of the results do not appear to depend on the ethnic composition of the samples.

Sex differences in the strength of covariation were most widely reported. Typically, these sex differences either were quite small or markedly variable across studies. There were, however, a few more consistent sex differences: Tobacco use was more strongly related to alcohol use, marijuana use, and delinquency for females than it was for males. Delinquency was more strongly related to risk-taking for males than for females. On the whole, the level of covariation among health compromising behaviors does not appear to be substantially related to age, sex, and ethnicity. More systematic research on this issue would be required to reach a more definitive conclusion.

Variation in the Strength of Covariation Among Health Compromising Behaviors

Methodological issues in assessing the strength of covariation.

Before we address the issues of which pairs of behaviors covary most and least and of the typical magnitude of covariation, it would be useful to review some methodological issues in measuring the strength of a relationship between two health compromising behaviors.

There are a number of statistics that can be used to assess the degree of relationship, such as simple percentages (e.g., comparing the percentage of marijuana users among tobacco smokers with the percentage among non-smokers), odds ratios (e.g., the ratio of the odds of marijuana use for smokers to the odds for non-smokers), and correlation coefficients (i.e., indices that range form +1 for a perfect positive relationship, through 0 for no relationship, to -1 for a perfect negative relationship). Simple percentages provide a general sense of the degree of relationship between variables, but provide little basis for comparison of relationships or studies. For a hypothetical example, assume that 60% of tobacco smokers and 50% of non-smokers drank alcohol, and that 12% of smokers and only 2% of non-smokers used cocaine. In both instances the group difference is 10%, but one would generally interpret the relationship as much stronger for cocaine than for alcohol. Odds ratios and correlation coefficients provide indices that express the degree of relationship in terms that can be compared across studies and across pairs of variables, and that are not dependent on the base rates or mean level of measures.

Most of the studies reviewed above reported relationships between health compromising behaviors in terms of correlations, and the majority of the remainder provided percentage figures that could be converted to odds ratios. These indices provided the basis of our examination of the strength of relationships. Nevertheless, there are a number of extraneous factors that substantially affect these indices, and those factors must be considered in interpreting the studies.

First, the apparent strength of relationship between two variables is reduced by error of measurement and by a lack of variability. Researchers are not able to measure any of these health compromising behaviors with perfect accuracy. Random errors due to factors such as inaccuracy in memory, idiosyncrasies in respondents' interpretations of survey questions, and short term inconsistency in behavior are unavoidable. Errors that are random are necessarily unpredictable, so the more error a measure contains the less it can be related to another measure, no matter how closely the underlying phenomena are related. Furthermore, the impact of error of measurement depends on the amount of true variability in the sample. For instance, if delinquency is quite rare in a sample, then measurement error will be a larger proportion of the observed variation, so delinquency will appear to be less related to other phenomena than it would in a sample in which delinquency was more common.

Indices of relationship also may be affected by the scale of measurement that is chosen. A researcher studying adolescent alcohol consumption might divide the sample in any of the following ways: 1) whether or not the respondent has consumed alcohol in the past year; 2) whether or not the respondent has consumed 5 or more drinks on a single occasion in the last two weeks; 3) whether or not the respondent currently consumes alcohol on a daily basis, 4) non-drinkers, occasional drinkers, frequent drinkers, and problem drinkers; 5) number of occasions the respondent consumed alcohol in the past year; or 6) number of problem drinking symptoms suffered by the respondent. The first three measures illustrate the approach of dichotomizing the sample into "problem" and "non-problem" groups. By the first measure, the "problem" of alcohol use is present in 85% of high school seniors, by the second it is present in 35%, and by the third it is present in only 4% (Johnston et al., 1989). If almost all or none of the sample have the problem, then this constitutes a lack of variability which, by the statistical principles discussed in the preceding paragraph, will tend to decrease the apparent strength of relationships of one measure to another.

The fourth through sixth measures divide the respondents along a continuum or a series of ordered categories. For almost all health compromising behaviors, the distribution of respondents on such measures will be highly skewed, with the vast majority falling at or near the zero point of the scale and a very small number widely scattered along the higher ranges of the scale. This is a very poor match to the symmetrical normal distribution that is the basis for most statistical techniques. These idiosyncrasies in the shape of the distribution of measures can have considerable impact on correlation coefficients, the most widely used measure of association. Correlation coefficients tend to be reduced when a pair of variables have very different distributions (e.g., one highly skewed and the other not) and to be greatly affected by "outliers" (cases with scores that are much higher or lower than others).

These methodological concerns lead us to be cautious in integrating the findings from the various studies. Different studies measure the same health compromising behavior in many different ways and use very different samples. For these reasons alone, we would expect considerable variability across studies in estimates of the strength of a single relationship. Rarely do we have information about reliability of measures, variability of samples, and shapes of distributions that would give some basis for correcting correlations for differences between studies. Thus, when we are faced with comparing one correlation, for instance between marijuana use and delinquency in one study, with another, such as the correlation between sexual behavior and school performance in another, we must keep in mind that they are comparable only in very crude rather than precise terms.

Even so, we are confident that comparison between studies is justified, provided that we do not attempt to make fine distinctions about the degree of relationship. The basis for this conclusion is that, within broad boundaries, relationships shown in Appendix A are quite consistent across studies that vary greatly in their samples (age, race, socio-economic status, etc.) and their measures (severity of problem, time frame, number of categories, etc.). For instance, all of the studies that assessed the relationship between marijuana use and the consumption of alcohol reported correlations that are quite high for social science research, though the specific estimates varied by a considerable degree: Of 16 correlations, 14 fell between .40 and .65. Similarly, all studies of mental health and substance use (in general populations of adolescents) found them to be only weakly related (correlations of -.03 to .21). Therefore, our interpretation of findings about the strength of relationships will be based on a general categorization of findings as relatively strong (typical correlations of .3 and above), moderate (typical correlations of .15 to .3) and weak relationships (typical correlations of less than .15). Of course, there are also cases where results are unavailable, ambiguous, or inconsistent.

The breadth of covariation among health compromising behaviors. Though we found evidence that almost all of the health compromising behaviors in adolescence we reviewed covary with one another, some pairs of behaviors are more strongly associated than others. In this section we will address which pairs are more strongly associated and which pairs more weakly associated. It must be remembered that we have a great deal more information about some of these behaviors than about others. Indeed, there is simply too little research on suicide to consider meaningfully the relative strength of its relationships to other behaviors.

Our basic finding is that the strongest relationships are concentrated among a subset of the health compromising behaviors, and that all pairings of these behaviors are strongly related to one another. This subset includes smoking tobacco, consumption of alcohol, marijuana use, use of other illicit drugs, juvenile delinquency, and sexual intercourse. This pattern is consistent with research on various subsets of these behaviors by Donovan and his colleagues (Donovan and Jessor, 1985; Donovan et al., 1988) and by Osgood et al. (1988) who concluded that a single underlying factor (in the factor analytic sense) could explain the relations among those behaviors.

It was not possible to determine whether there are additional clusters of closely related behaviors among the remaining set because we had no information about many pairings of those behaviors. Of those cases where data were available, none of the relationships could be classified as strong by our standards.

The behaviors that fell outside of the strongly related group varied in how closely they were associated with that group. Risk-taking, school performance, and problem behavior at school each consistently had moderate to strong relationships with all of the strongly related subset. It is striking that risk-taking and problem behavior at school were this strongly related to other health compromising behaviors because the studies relied on very limited measures for each of them. Most studies of risk-taking concerned either use of seat belts or dangerous driving, and most studies of behavior problems at school concerned truancy. It is possible that risk-taking and behavior problems at school would fit in the strongly related subset of health compromising behaviors if they were assessed by measures that captured a broader range of the relevant phenomena. Indeed, Osgood et al. (1988) concluded that dangerous driving could be grouped in a single factor with several measures from the strongly related subset of health compromising behaviors. This was true even though it was the least reliably measured of the behaviors and somewhat less of its reliable variance was associated with the general factor.

Mental health problems and unprotected sexuality/parenthood were less closely associated with the strongly related subset, though they were still positively related. It should be remembered that most of these weaker relationships are still genuine, and they may have important consequences. The point here is only that they are not of the same magnitude as the relationships of among the cluster of strongly related behaviors. It does not appear that any of the health compromising behaviors in adolescence we have considered is a fully independent phenomenon that is essentially unrelated to the others.

The strength of covariation among health compromising behaviors. The policy implications of covariation among health compromising behaviors in adolescence depend a great deal on just how strongly the behaviors are related. Consider, for instance, the problem of coordinating services for pregnant adolescents with treatment services for drug abuse if a substantial majority of pregnant adolescents also abused drugs. This problem would be very different if the rate of drug abuse among pregnant adolescents were only slightly higher than among adolescents in general.

It is helpful to begin our consideration of the strength of relationships by looking closely at a single example. Seemingly, the most direct way of expressing covariation is in terms of the rate of joint occurrence of a pair of behaviors. For instance, Elliott et al. (1989, p. 228, 1976 data) found that 16% of serious delinquent offenders were polydrug users (their category for serious drug use) in comparison to only 2% of other youth. Thus, the rate of drug abuse problems is many times greater for adolescents who engage in a high level of delinquency, and we would consider this a very strong relationship. Even so, the vast majority of serious delinquents are not serious drug users (84%). Furthermore, most polydrug users were not serious delinquents: Because only 9% of the sample were serious delinquents, 1.4% of the total sample were both polydrug users and serious delinquents (16% of 9%) and 1.8% of the total sample were polydrug users but not serious delinquents (2% of 91%). This illustrates that, when health compromising behaviors are relatively rare, joint occurrence of the behaviors will be limited, even when the behaviors are strongly related.

Next consider what happens when we broaden the definition of delinquency to include the 40% of the sample who reported engaging in four or more illegal acts. This group would include 81% of all polydrug users. By broadening the definition of delinquency in this way we capture the vast majority of serious drug users, but in doing so we reduce the proportion of serious drug users in the delinquent group from 16% to 7%. This pattern is the typical result of varying the strictness of our definition of a problem behavior: The more restrictive the definition, the smaller the proportion of the total population that will be in the problem group, the higher the problem group's rate of any second related problem, but the larger the proportion of people who have the second problem but not the first. Thus, rates of joint occurrence are highest when the definitions of problem behavior are set at trivial levels, such as ever having had a sip of alcohol and ever having taken a puff from a cigarette.

This is a pervasive difficulty for the study of health compromising behaviors in adolescence. There is a great deal of latitude in setting a criterion for any of these behaviors. How much tobacco smoking is enough to consider a problem? Most of us would agree that smoking one cigarette is not a serious health risk. But should we consider a few cigarettes per month a problem, should we limit our attention to daily smoking, or should we only consider people who smoke a half pack of cigarettes or more per day? This choice will greatly affect the rate of other behaviors among the group we designate as smokers, and different criteria would be appropriate for different purposes. For instance, a broader definition makes sense for designing a health education program aimed at the general adolescent population, and a narrower definition would be appropriate for an intensive intervention program that will target a small group.

Because simple percentages and proportions are so greatly affected by the base rates of the behaviors in the general population, researchers usually prefer indices such as odds ratios and correlations for expressing the strength of relationships. These indices express the degree of association in terms that can be translated to varying base rates. For instance, the two definitions of delinquency used in the example above yield very similar odds ratios, which are the odds of drug use for delinquents divided by the odds of drug use for non-delinquents. This ratio is 8.4 for the more restrictive definition of delinquency, and it is 6.7 for the less restrictive definition. Thus, whichever definition is used, the presence of delinquency increases the odds of drug abuse many times over, and the presence of drug abuse increases the odds of delinquency to an equal degree.

Researchers often use measures that distinguish among several levels of each behavior, in which case the relationship between behaviors can be expressed in terms of a correlation coefficient. Studies using this approach indicate that the correlation of delinquency to use of illicit drugs other than marijuana is in the range of .36 to .43 (see Appendix A). Correcting these figures for the reliability of the measures, using estimates from Osgood et al. (1988), yields a range of .49 to .69. The standard Pearson product-moment correlation coefficient is equivalent to the regression coefficient for predicting standardized scores on one variable from standardized scores on the other. Thus, a correlation of .5 implies that a person's expected score on one measure is half as many standard deviations above (or below) the mean as their score is above (or below) the mean on the other measure. We can, therefore, interpret this level of correlation between delinquency and drug use to indicate that adolescents with high levels of delinquency will have considerably higher than average rates of drug use, but their rate of drug use will be only about half as extreme as their rate of delinquency. This mirrors the information contained in the percentages from Elliott et al. (1989): The vast majority of polydrug users had some involvement in delinquency, and a substantial minority of them are seriously involved in delinquency. The information Elliott et al. provided about less serious substance use (marijuana or alcohol use) makes it clear that this relationship is symmetrical, in accord with the implications of the correlation coefficients: The typical serious delinquent used marijuana or alcohol, but the majority of these youths did not use other illicit drugs.

Next, to illustrate the nature of the relationships we have classified as "weak," we turn to substance use and mental health problems. Elliott et al. (1989, p. 228, 1976 data) found that 16% of adolescents who used alcohol at least four times (or any illicit drug) in the past year had mental health problems, defined in terms of scores above a criterion level on a scale of emotional problems. This contrasted with mental health problems for 11% of the remaining adolescents. Expressing this in a different fashion, 37% of adolescents with emotional problems used alcohol or other substances, in comparison to 26% of adolescents without emotional problems. These percentages correspond to an odds ratio of 1.6.

The correlations between various measures of mental health difficulties and alcohol use reported in Appendix A ranged from .03 to .16. This level of correlation is consistent with the figures for percentages and odds ratios. High levels of alcohol use coincide with a slightly higher than average level of mental health problems, and serious mental health problems are associated with moderately increased rates of alcohol consumption.

Jessor and Donovan (Donovan and Jessor, 1985; Donovan et al., 1988; Jessor and Jessor, 1977) have argued that there is a syndrome of problem behavior in adolescence that is comprised of a set of activities essentially identical to the group we have designated as the strongly related health compromising behaviors in adolescence. They consider them a syndrome because there are relatively strong correlations among them and because all have similar relationships with the explanatory variables included in Jessor's problem behavior theory (Jessor and Jessor, 1977). This perspective has been very influential in the field of adolescent health.

After a very thorough examination of relationships between delinquency, substance use, and mental health in their National Youth Survey, Elliott et al. (1989, p. 199) decided that there was little evidence of a multi-problem behavior syndrome.

They arrived at this position because they found very few adolescents who simultaneously met their criterion levels for problems in all three areas, and they found that somewhat different combinations of explanatory variables were best suited to the three types of behavior.

This disagreement is at the heart of our concern with gaining an understanding of the strength of relationships between the health compromising behaviors. We believe that the positions of Elliott et al. and Jessor and Donovan can be reconciled. First, Elliott et al. include mental health problems, which we found to be only weakly related to other health compromising behaviors and which Jessor and Donovan do not include in their set of problem behaviors. More importantly, the small number of adolescents with all three types of problems is perfectly consistent with what we saw in our consideration of the relationship between delinquency and illicit drug use. Whenever the probability of serious levels of each of two problems is low, very few adolescents will reach that level of both problems simultaneously. This will be true even if the presence of one problem increases the odds of the other problem many times over. Thus, Elliott et al.'s finding that few adolescents had all three problems expresses an important fact about the limited implications of relationships that are quite strong by social science standards.

The term "syndrome" implies a set of symptoms that is related due to shared underlying causes (Morris, 1981). To what extent do various health compromising behaviors in adolescence result from such shared causes? We will consider the problem of determining shared causes below. For the moment, however, we can gain a sense of the plausible range of shared causes from information about the strength of relationships between pairs of behaviors. When squared, correlation coefficients correspond to the proportion of variance that two variables share in common. This figure indicates a limit to the extent to which a pair of variables can be explained by the same causal factors. Of course, some share of the variance of each measure is random error that is, in principle, not subject to explanation. Thus, we are interested in the proportion of the reliable variance in a given health compromising behavior that is shared with one or more other behaviors, and therefore might be subject to a single explanation.[8] The larger this proportion, the more meaningful it is to consider the set of behaviors a syndrome. Osgood et al. (1988) have assessed the extent of this overlap for several of the health compromising behaviors considered above. They concluded that the proportions of reliable variance shared with other health compromising behaviors were 50% to 75% for delinquent behavior, 35% to 45% for alcohol, marijuana, and other illicit drug use, and 25% to 30% for dangerous driving.

These findings cannot resolve the semantic issue of the degree of shared variance necessary for a set of problems to qualify as a syndrome. Nevertheless, it is clear 1) that a single set of explanatory factors might well account for a great deal of the variability in each of the strongly related subset of health compromising behaviors, but also 2) that there are equally important unique features of each behavior that require separate explanations. In other words, Jessor and Donovan are correct in stressing that the various problem behaviors have much in common and the presence of any one increases the odds of others. On the other hand, Elliott et al. provide an important insight in pointing out that there is much that is distinct about each of the behaviors and that we cannot expect them all to arrive in a single package.

Relationships Between Health Compromising and Health Promoting Behaviors

Concentrating on health compromising behaviors is appropriate because of the prominence of these behaviors as sources of mortality and morbidity during adolescence. Even so, there are numerous health promoting behaviors that have important bearing on the long-term (and sometimes short-term) health of adolescents. Such behaviors would include healthy eating habits, exercise, tooth brushing, using seat belts, and so forth.

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[8] To illustrate, this means that the correlations of .36 to .43 between delinquency and use of illicit drugs other than marijuana would correspond to these variables sharing 13% to 18% of their total variance. The correlations corrected for reliability were .49 to .69, meaning that delinquency and illicit drugs use have 24% to 48% of their reliable variance in common.

There are several recent studies that assess relationships among health promoting behaviors and between those behaviors and health compromising behaviors (Donovan et al., in press; Hays et al., 1984; Kannas, 1981; Nutbeam et al., 1989). Most notably Jessor and his colleagues have begun to examine health promoting behaviors from the perspective of his problem behavior theory (Costa et al., 1989; Donovan et al., in press; Perry and Jessor, 1985).

The general finding that emerges from this work is that relationships among health promoting behaviors typically are positive and weak, but also rather variable. Correspondingly, relationships between health promoting and health compromising behaviors were negative and weak, but variable. Factor analyses of these behaviors have resulted in the health compromising behaviors forming a well defined factor and either separate factors or no significant loadings for the health promoting behaviors (Hays et al., 1984; Kannas, 1981; Nutbeam et al., 1989). Donovan et al. (in press) report that a measure combining several types of health promoting behaviors was more strongly related to health compromising behaviors. Though relationships were weak among regular physical activities, hours of sleep, use of safety belts, attention to healthy diet, and healthful food preferences, when combined their correlations to delinquency and substance use were -.15 to -.35.

Considerably more research is needed before reaching definitive conclusions about covariation involving health promoting behaviors. Results so far would seem to indicate that there will not be the strong and consistent patterns of relationships among these variables that are found among many health compromising behaviors.

Across-Time Relationships among Health Compromising Behaviors in Adolescence

There is far less information available about across-time relationships among health compromising behaviors in adolescence than about concurrent relationships. This places two major limitations on our coverage here. The first limitation is that the longitudinal research covers very few of the possible pairings among health compromising behaviors we are considering. Thus, it simply will not be possible to systematically review all the combinations of behaviors as was done above for the concurrent relationships. Furthermore, there are several types of longitudinal relationships that may be of interest, and there are only a few studies of each. This means that we will be limited to treating those studies as examples of what we might expect to gain from this type of research.

The second limitation of available longitudinal research on covariation among health compromising behaviors in adolescence is that almost none of that research is strictly limited to adolescents. Though there are a number of studies that begin with a sample of adolescents (i.e., ages 11 through 18), either all of the respondents (e.g., Osgood et al., 1988) or a large portion of them (e.g., Elliott et al., 1989) are no longer adolescents by the end of virtually every study. Though this research goes beyond the mandate for the present paper, it is likely that much of the work is still relevant to across-time relationships during adolescence.

On the positive side, many of the studies of across-time relationships are of very high quality. A large proportion of them use representative national samples, such as the Youth in Transition study (Johnston et al., 1978), the National Youth Survey (Elliott et al., 1989), the Monitoring the Future study (Osgood et al., 1988), and the National Longitudinal Survey of Youth (Yamaguchi and Kandel, 1987).

Because of the above limitations, the present discussion will be limited to reviewing the kinds of useful information that longitudinal research might provide, some of the special issues of interpretation that arise with longitudinal research, and some general findings of interest from available research. Three types of longitudinal relationships are considered below: predictive relationships, sequences of behaviors, and causal influences among health compromising behaviors.

Predictive Relationships Among Health Compromising Behaviors in Adolescence

The most typical use of longitudinal research in investigating covariation among health compromising behaviors in adolescence is to assess whether the existence of one or more health compromising behaviors foretells the later appearance of others. The pioneering work in this area is Robins' (1966) long term follow-up of a sample of adults who had attended a child guidance clinic decades earlier. Most of the longitudinal studies provide at least some information about whether one or more earlier health compromising behaviors is associated with one or more later behaviors.

Through a series of studies, Robins and her colleagues (Robins, 1966; Robins and Ratcliff, 1980a, 1980b; Robins and Wish, 1977) have succeeded in demonstrating that those health compromising behaviors of adolescents that reflect some type of deviance (i.e., violations of conventional standards of behavior for adolescents) are associated with a wide variety of later problems in adulthood. Like Jessor and Donovan (Donovan and Jessor, 1985; Jessor and Jessor, 1977), Robins and Ratcliff (1980a) argue that the problem behaviors form a syndrome. They arrive at this conclusion from evidence that each of a variety of different problems in childhood correlates with the overall level of problems in adulthood, that each adult problem correlates with the overall level of childhood problems, and that the across time relationships do not depend on the continuation of any specific problem from adolescence into adulthood. In contrast to this pattern, Robins (1966) found that other types of adolescent psychiatric symptoms (e.g., fearfulness, insomnia, hypersensitivity) were not related to psychiatric or other problems in adulthood.

Robins' finding of a general pattern of across-time relationships among health compromising behaviors is bolstered by many other longitudinal studies of health compromising behaviors in adolescence. Elliott et al. (1989, p. 175) found that earlier minor delinquency, serious delinquency, alcohol use, marijuana use, use of other illicit drugs, and mental health problems are each associated with a increased risk of later having any of those problems. Tennant and Detels (1976) reported that abuse of hashish, amphetamines, opiates, and alcohol were all more common among those 18-24 year olds who had begun consuming alcohol, cigarettes, or coffee by age 12. Kandel and her colleagues have conducted an extensive series of studies (Kandel, 1975; Kandel et al., 1978; Paton et al., 1977; Yamaguchi and Kandel 1984a, 1984b, 1987) of longitudinal relationships both among various types of substance use and of substance use to other health compromising behaviors such as depression, grades, absenteeism, and delinquency. Without reviewing the specific pairs of behaviors addressed in this extensive research, suffice it to say that these studies also provide ample evidence that the appearance of any one type of health compromising behavior is positively related to the later occurrence of many others.

One important feature of Robins' research is that the variety of health compromising behaviors in adolescence is more strongly related to later behaviors than is any single behavior (Robins, 1966; Robins and Ratcliff, 1980a). Research by Newcomb et al. (1986) supports this perspective. They found that the prevalence and frequency of use of five substances was strongly related to the number of risk factors present three years earlier. Five of these ten risk factors are other health compromising behaviors.

These simple predictive relationships are consistent with the concurrent relationships reviewed above. As with concurrent relationships, not all pairs of health compromising behaviors are equally related across time. Though the coverage is less systematic for the longitudinal relationships, it appears that those pairs that are most strongly related concurrently (e.g., relations among different types of substance use and between illegal behavior and substance use) also are most strongly related over time. We located no information about across time relations of suicide attempts with other types of health compromising behaviors.

Sequences of Health Compromising Behaviors

A few studies have addressed the sequence in which health compromising behaviors appear in adolescence. Kandel's work on stages of involvement in drug use is the best known in this area (Kandel, 1975; Kandel and Logan, 1984; Kandel et al., 1978; Yamaguchi and Kandel, 1984a, 1984b). The thrust of her findings is that more serious forms of substance abuse are unlikely to occur without the previous appearance of the forms that are less serious and more common. The most typical sequence is alcohol, cigarettes, marijuana, other illicit drugs, and prescribed psychoactive drugs (Yamaguchi and Kandel, 1984a). Elliott et al. (1989) addressed sequencing among substance use, delinquency, and mental health problems. The typical sequence in their study began with minor delinquency, followed by alcohol use, serious delinquency and/or mental health problems, marijuana use, and use of other illicit drugs. Mental health problems did not serve as a precursor to the other behaviors.

Knowledge about typical sequences of behaviors is of potential value for selecting target populations and designing service delivery. The simple actuarial fact that serious illicit drug use is very rare among youth who do not smoke or drink potentially could lead to better diagnostic procedures and to more effectively directing resources for public health education. It is important, however, that existence of common sequences not be interpreted inappropriately. There are several concerns in this regard.

Both Kandel and her associates (e.g., Yamaguchi and Kandel, 1984a) and Elliott and his colleagues (1989) stressed that these sequences are far from inevitable. Large proportions (usually the majority) of the adolescents who engage in any behavior early in the sequence do not go on to the later stages. On the other hand, the later stages are relatively unlikely to occur in the absence of the earlier stages. Thus, the earlier behaviors are never sufficient conditions to generate the later behaviors. Also, the degree to which an earlier behavior serves as a necessary condition for the appearance of a later behavior is variable. Elliott et al. found that this connection was much stronger for sequencing between levels of the same type of problem rather than sequencing that involved more distinct problems. For instance, alcohol use more reliably preceded marijuana use and minor delinquency more reliably preceded serious delinquency than alcohol use preceded serious delinquency.

It is also important that the typical sequence of behaviors not be interpreted as indicating that the earlier behaviors are in some sense the causes of the later behaviors (Elliott et al., 1989; Robins and Wish, 1977; Yamaguchi and Kandel, 1984a). To a large extent, the sequence of behaviors is dictated by the typical age of onset of the behaviors and their prevalence or base rate in the population. Alcohol use and minor delinquency appear early in the sequences because they are common among younger adolescents. This does not necessarily mean that those behaviors themselves contributed to the later behaviors. Indeed, they may not be especially useful predictors. For instance, Elliott et al. (1989, p. 171) reported that virtually 100% of adolescents who used marijuana had also drunk alcohol. This is not particularly impressive when we consider that 84% of the sample who did not smoke marijuana also had drunk alcohol.

The age at which a behavior first appears is an important aspect of its predictive utility. For instance, consuming alcohol and coffee are such common activities for adults that, at moderate levels, they would have little relationship to other health compromising behaviors at that age. Tennant and Detels (1976) demonstrate, however, that when these behaviors occur before age 12 they are related to serious substance use in early adulthood. This is analogous to the common finding that the age of first arrest is a useful predictor of seriousness, frequency, and duration of involvement in delinquency and crime. As Hirschi and Gottfredson (1983) point out, there is a very straightforward interpretation for this pattern: At ages when very few people have a given behavior, its appearance will be concentrated among those people who are most strongly disposed to that behavior. In other words, if 85% of high school seniors and 10% of 7th graders consume alcohol on a regular basis, then alcohol consumption tells us much more about a 7th grader than about a high school senior.

Causal Relations among Health Compromising Behaviors in Adolescence

A number of studies have tackled the more difficult problem of determining whether specific health compromising behaviors in adolescence are of unique and independent value in predicting other, later health compromising behaviors. This raises the issue of whether engaging in one health compromising behavior can cause people to engage in another. A widely discussed causal sequence would be use of illicit drugs leading to theft in order to purchase more drugs. It is also easy to construct plausible causal sequences of this on the basis of well known theories (Osgood et al., 1988). For instance, engaging in any one socially unacceptable behavior might provoke a negative reaction from conventionally oriented peers. Labeling theory would see this as a source of stigma, which in turn would lead to acceptance of a deviant identity and a variety of health compromising behaviors. Differential association theory would point to a shift in the deviance of one's peers, which would enhance the probability of additional health compromising behaviors.

Despite these plausible scenarios of one health compromising behavior causing another, there are special conceptual and methodological difficulties involved in demonstrating that one behavior "causes" another. A somewhat simpler issue is whether any given behavior has a predictive validity that is not attributable to any other factors in some set of potential predictors. This goes beyond the issues discussed above, which simply concern whether behaviors are related over time. Here we ask whether this relationship is substantial enough that it cannot be attributed to other factors. Of course, the answer to this question is somewhat dependent on what other factors are considered.

A number of studies have addressed this question, using a wide variety of health compromising behaviors in adolescence and other personal, family, and community characteristics as potential predictors (Elliott et al., 1989; Johnston et al., 1978; Paton et al., 1977; Kandel et al., 1978; Yamaguchi and Kandel, 1984b; Robins and Wish, 1977). The strongest pattern that emerges from these studies is that there is a great deal of continuity in most of the health compromising behaviors: The best predictor of later behaviors is invariably the same behavior (or a version of it) at an earlier time. There are many additional instances in which other health compromising behaviors have a predictive relationship to a later health compromising behavior that cannot be explained by earlier levels of that behavior. For instance, Paton et al. (1977) found that depressive mood was related to the onset of marijuana use among adolescents who did not previously use marijuana. The pattern of these relationships varies a great deal depending on the particular health compromising behavior being predicted and what set of potential predictors is being considered.

In interpreting predictive relationships among health compromising behaviors, one explanation that must be considered is that the behaviors are related because each is least partially caused by the same set of factors, rather than that either causes the other. This is implicit in the idea of a syndrome of problem behaviors discussed earlier. From this perspective, the specific manifestations of the syndrome for a given person are, to some degree, a function of chance. Thus, any behavior might appear to be a cause of others because it gives a partially independent indication of an individual's standing on the underlying causes. This possibility must be ruled out before one behavior can be considered the cause of another.

Robins and Wish (1977) attempted to test this alternative hypothesis by assessing whether specific health compromising behaviors had predictive power after controlling for the number of different behaviors present at an earlier time. Though this approach is not sophisticated by the standards of today's statistical methods, it does capture much of the predictive power we would expect to characterize a general tendency toward health compromising behavior. Indeed, Robins and Wish found that few significant predictive relations remained once the sheer number of problem behaviors had been taken into account.

Osgood et al. (1988) addressed the same issue through a causal model which separated the general and specific components of each of five health compromising behaviors, and assessed their predictive relations across three points in time. Their approach had the additional advantage of allowing for the effects of error of measurement, which might otherwise lead to the appearance of spurious causal relationship. Osgood et al. found that the across-time relations among these behaviors could be accounted for almost entirely by continuity in a general tendency toward such behaviors and by continuity in the specific aspects of each behavior. In addition to these relations, they found only one additional influence (out of 20 possible influences): Marijuana use during the senior year of high school predicted higher levels of use of other illicit drugs one to two years later, even after controlling for the contribution of the general tendency to both.

These findings suggest that there are few instances in which one health compromising behavior has an influence on other later behaviors that is not attributable to the stability of either the specific behavior itself or to causes that both behaviors have in common (as might be indexed by a general tendency toward health compromising behaviors). Even in these cases, it is more plausible to think of behaviors as indirect rather than direct causes of one another. If one behavior "causes" another, it is likely to be because it creates other conditions such as friendship networks, chances for conventional success, or exposure to additional opportunities or risks.

EXPLANATIONS OF COVARIATION AMONG HEALTH COMPROMISING BEHAVIORS IN ADOLESCENCE

The findings concerning covariation among health compromising behaviors in adolescence can be summarized quite simply. There is a subset of behaviors that are strongly related to one another. This group includes smoking tobacco, consuming alcohol, using marijuana, using other illicit drugs, juvenile delinquency, and sexual intercourse. The other health compromising behaviors also covary with behaviors in this group to varying degrees. School performance, problem behavior at school, and risk-taking all are moderately to strongly associated with this group. Unprotected sexual behavior and parenthood and mental health problems are more weakly associated with each other and with the strongly related subset of behaviors. This general pattern of relationships appears to hold across time as well as concurrently, and the across-time relationships largely are attributable to the stability of the individual behaviors and the stability of individual differences in a general tendency toward such behavior.

Relatively little has been written in explicit attempts to explain relations among behaviors of this sort. Few of the studies cited above or in Appendix A were theoretically motivated or offer any theoretical interpretations of their results. Of course, in the theoretical literatures for each of the separate behaviors there is an abundance of material from which one could construct possible explanations.

In searching for an adequate explanation, it must be remembered there is no one central health compromising behavior that is so strongly associated with all others that factors in that domain could serve as the central cause of the entire set. For instance, one might hypothesize that learning disabilities lead to problems at school, which in turn lead to the remaining health compromising behaviors. For this to be the case, however, all of the remaining behaviors would have to correlate more highly with school performance than with each other. That simply is not the case. Instead, the set of relationships is sufficiently homogeneous that it is most appropriately explained by a theory that addresses features common to all of the strongly related subset of behaviors (Donovan and Jessor, 1985; Osgood et al., 1988). This does not deny the potential validity of more specific theories as partial explanations of relationships between specific behaviors. For social phenomena such as these, explanations rarely are mutually exclusive.

There would seem to be two features that the strongly related subset of behaviors have in common, and which could therefore serve as the basis of general explanations for covariation among health compromising behaviors in adolescence. One feature shared by these behaviors is that all are violations of social norms as to what conduct is appropriate for adolescents. In other words, these are activities that sociologists refer to as deviant behavior and which Jessor has termed problem behavior. Jessor and Jessor defined problem behavior as "behavior that is socially defined as a problem, a source of concern, or as undesirable by the norms of conventional society and the institutions of adult authority, and its occurrence usually elicits some kind of social control response." (1977, p. 33)

Another feature of all of these behaviors is that they involve taking risks. These risks may be in the form of long term or short term health consequences (e.g., smoking or dangerous driving), difficulties that interfere with chances of conventional success (e.g., unprotected intercourse), or detection by disapproving adults (e.g., juvenile delinquency). Note that these two interpretations of the health compromising behaviors overlap to a considerable degree. Dangerous behaviors and behaviors that would reduce chances of later success usually are disapproved by adults, and they are prominent among the activities proscribed by conventional norms. Conversely, detection by adults is one of the major risks for these activities, and that is a risk only because the behaviors are disapproved.

Explanations of health compromising behavior as deviance. As Osgood et al. (1988) have pointed out, virtually all sociological and social psychological theories of deviance are compatible with the idea that various deviant behavior would have causes in common, and there could, therefore, be consistent individual differences in the tendency to engage in deviant behavior. The theories do differ in the degree to which they explicitly require pervasive individual differences. For instance, Akers' (1977) social learning approach explains each deviant behavior as a result of associating with people who model and reinforce that behavior. According to this theory, then, different deviant behaviors will covary only to the degree that groups which model and reinforce one deviant behavior also model and reinforce the others. Thus, this theory does not require covariation among deviant behaviors, but it would be compatible with covariation. Other theories more strongly imply at least a moderate level of covariation, such as "strain" theories, which argue that alienation is a partial determinant of a variety of deviant behaviors (e.g., Cloward and Ohlin, 1960; Elliott et al., 1985), social control theory, which views deviance as arising from a lack of social bonds (e.g., Hirschi, 1969), and labeling theories, which point to the formation of deviant identities as a consequence of stigma (e.g., Lemert, 1972).

Jessor and his colleagues (Donovan and Jessor, 1985; Donovan et al., 1988; Jessor and Jessor, 1977) take a stronger position explicitly hypothesizing that a wide variety of deviant or problem behaviors are all manifestations of a general dimension of conventionality versus unconventionality. Jessor's problem behavior theory portrays all of these behaviors as arising out of three systems of psychosocial influence: the personality system, the perceived environment, and the behavior system. Jessor has applied this theory to a large set of deviant behaviors, and he has more recently applied it to the general problem of adolescent health (Jessor, 1984). To the degree that there is any theoretical basis cited for research on covariation among health compromising behaviors in adolescence, it is primarily problem behavior theory.

Hirschi and Gottfredson offer a somewhat different interpretation of the same pattern of generality across types of deviant behavior (Gottfredson and Hirschi, 1986; Hirschi, 1984; Hirschi and Gottfredson, 1986). They give this tendency toward deviance the label "criminality," which they define as "the tendency or propensity of the individual to seek short term, immediate pleasure" (Hirschi, 1984, p. 51) Though the term "criminality" seems inappropriate for the purposes of the present paper, the concept they define is plausible as a general cause of the strongly related subset of health compromising behaviors.

Theories of deviance provide an appealing starting point for explaining covariation among health compromising behaviors in adolescence because they place this phenomenon in the context of a broad net of social influences and personal predispositions. Empirical support for this approach can be found in studies such as those of Elliott et al. (1985) and Jessor and Jessor (1977) who demonstrated that several different deviant (or health compromising) behaviors were associated with the same explanatory factors, such as poor relationships with parents, lack of success at conventional activities (e.g., school or church), and associating with deviant peers.

Explanations of health compromising behaviors as risk- taking. A substantial portion of the empirical studies of covariation among health compromising behaviors in adolescence refer to the behaviors as forms of risk-taking, but virtually none of them cast the research in terms of any theory of risk-taking. A coherent perspective on health compromising behaviors in adolescence as arising from risk-taking is developed by Irwin and Millstein (1986) in their systematic review of relations between "biopsychosocial" correlates of several specific behaviors. Their approach has a number of appealing features that are lacking in the theories of deviance. First, it is explicitly developmental in that it centers around the changes in skills, concerns, and social setting that occur throughout adolescence. Second, they incorporate cognitive abilities and decision-making processes along with the types of personal characteristics and features of the social environment that can be found in theories of deviance. Third, Irwin and Millstein place health compromising behaviors in the context of normal and positive aspects of adolescence. They see risk-taking behaviors as fulfilling many developmental needs such as autonomy, mastery, and intimacy.

Risk taking also can be interpreted in terms of sensation seeking. Zuckerman's (1979) work on defining and measuring a personality trait of sensation seeking has led to an extensive body of research on individual differences in risk-taking. A variety of health compromising behaviors such as sexual experimentation and delinquency have been shown to be correlated with this trait (White et al., 1985; Zuckerman, 1979, 1983). Zuckerman's approach is a useful complement to the model provided by Irwin and Millstein (1986) in that it concentrates on the biological and personality contributions to individual differences in risk-taking.

There is considerable empirical evidence for Zuckerman's model of sensation seeking. Irwin and Millstein's risk-taking model of health compromising behaviors in adolescence has not been directly tested, but it is well grounded in empirical research. Though the theoretical perspectives underlying Irwin and Millstein's model have substantial empirical support, there is no empirical support for their application to covariation among health compromising behaviors.

One caution is in order about risk-taking as an explanation of covariation among health compromising behaviors. "Risk" is an extraordinarily popular term in the literature on adolescent health, and it is used very loosely. For risk-taking to be useful as a central explanatory concept, precision and clarity in usage is essential. Must risk be the goal of the behavior for it to considered risk-taking, or need the adolescent even be aware that he or she is taking a risk? In the former case, many health compromising behaviors may not qualify as risk-taking. It is also necessary to decide whether to distinguish between sensation seeking and risk-taking. One can seek sensation without serious risk (e.g., through movies and music), but is a preference for such activities relevant to a preference for risk-taking in general and for risking one's health in particular?

GAPS IN KNOWLEDGE AND PRIORITIES FOR FUTURE RESEARCH

Though there are a number of important gaps in our knowledge about covariation among health compromising behaviors in adolescence, we already know a great deal about this subject. Considering that there are few studies that have this topic as their primary agenda, our understanding of this phenomenon is quite advanced.

There are many studies about concurrent relationships among health compromising behaviors as assessed by cross-sectional research, but information is still sparse in several areas. First, we know little about relations between some pairs of health compromising behaviors. As noted earlier, there are far fewer studies of risk-taking and suicide in relation to other health compromising behaviors in adolescence, and those studies that are available rarely used large probability samples. We have almost no information about the relationships between these health compromising behaviors or their relationships with problems involving sexuality or with school problems. Risk-taking activities should be a high priority for research, given the strength of the relationships that have been found using limited measures.

There is also a shortage of research about whether relationships among the health compromising behaviors are consistent across age levels, ethnic groups, sex, socio-economic factors, urban vs rural residence, etc. Those comparisons that have been made indicate that relationships are more likely to be consistent than inconsistent across such factors, which is quite encouraging. Nevertheless, the information base is scanty, with the exception of sex differences. Furthermore, the available research is predominantly based on older adolescents who remain in school, and there are few samples with an adequate base of minority, rural, inner city, or poor adolescents for separate analyses. Given the dramatic changes in the rates of many of these behaviors across the age span of adolescents, it is especially important to get more information about younger adolescents.

In conducting research comparing the strength of relationships, it is important that conclusions be based on explicit significant tests for differences between groups. The presence of a significant relationship in one group and not another is not sufficient. Appendix A contains numerous instances of this sort that are merely a function of one group having a larger sample size rather than a stronger relationship. Only with an explicit significance test can we determine whether observed differences in the strength of relationship are greater than would have been expected by chance.

Longitudinal research is a powerful tool for studying social and health problems, and there is far less longitudinal research than cross-sectional research on covariation among health compromising behaviors in adolescence. Even so, we would not give longitudinal research any higher priority than cross-sectional research in this area. Longitudinal research is far more expensive to conduct, and there is a greater time lag until results become available. Public and private funds for research are very limited. For every large-scale, long-term research project that is funded, funds must be denied to numerous worthy projects. The current emphasis on such studies concentrates an inordinate share of the limited resources in the hands (and on the ideas) of a few researchers. It would be more prudent to keep a substantial pool of resources available for smaller projects in order to support more researchers and for the larger projects to be the property of (i.e., designed by and available to) the field as a whole rather than individuals.

Though it is important that there be longitudinal research on covariation among health compromising behaviors, it has not so far proved to be of especially greater value than other research. Patterns of covariation across time have largely been consistent with concurrent relationships. Of course, there are gaps in our knowledge about longitudinal relationships, and they deserve attention. But this is no more or less important than other gaps in our knowledge.

For the purposes of the present paper, the most important shortcoming of available longitudinal research is that there is almost no information about relationships during adolescence itself. The relevant research almost always begins with a sample of late adolescents or of the full age span of adolescents. By later follow-ups, all or most of the sample is past age 18. To remedy this shortcoming, research is needed that follows substantial samples from early or mid-adolescence through late adolescence. Available research does not lead us to expect unusual results from such a study, but it is not acceptable to base policies for adolescents solely on extrapolation from research on older groups. Longitudinal research should also be designed to cover systematically a broader range of health compromising behaviors.

It also would be useful to conduct longitudinal research to ascertain how well relationships across time can be predicted from the combination of concurrent relationships and age specific rates of each problem. Such research might well be done with data that are already collected. If this approach to prediction were successful, it would provide an inexpensive and flexible means of making diagnostic predictions and gauging the appropriateness of specific target populations. The findings of available longitudinal studies suggest that such an approach would be successful, but it has not been explicitly tested.

Another area in which further research should be productive is in testing alternative explanations of covariation among health compromising behaviors. An issue that remains to be addressed empirically is whether covariation is a function of either deviance or risk-taking, or both. Osgood et al. (1988) found that alcohol consumption became less related to other problem behaviors as respondents became older and, presumably, drinking became both legally and normatively acceptable. They suggest that this link between deviance and covariation be further tested by examining changes in levels of covariation in other behaviors for which normative prescriptions are highly age dependent, such as smoking cigarettes and sexual intercourse. The relevance of risk-taking to covariation among health compromising behaviors could be assessed by studying the association of health compromising behaviors with a broad range of risk-taking or sensation seeking activities. If risk-taking is the central feature that determines covariation, then health compromising behaviors would be equally related to risky, deviant activities and to more normatively acceptable risky behaviors, such as sky-diving, rock climbing, or rodeo riding. Of course, general etiological research on the health compromising behaviors is relevant to explaining covariation as well. Conversely, Osgood et al. (1988) have demonstrated that research on covariation can be a useful tool for assessing the relative merits of etiological theories.

Finally, research should be expanded in the direction of testing the utility of information about covariation for guiding health services. This would take the form of evaluation research on programs implementing the kinds of applications found in the following section.

IMPLICATIONS FOR HEALTH SERVICES

There are several ways in which health services might be improved by capitalizing on the fact that health compromising behaviors tend to covary. Any time that information is available about the presence or absence of a behavior, that information is a potential basis for inferring the likelihood of a wide variety of other behaviors. The predictive validity of this information could be used for a broad range of purposes such as individual diagnosis, setting admissions criteria for treatment programs, chosing locations for clinics with special services for high risk populations, designing coordinated services for a variety of different problems, and targeting resources for prevention and health education programs.

In applying knowledge about covariation among health compromising behaviors to these purposes, it is important to be cognizant of the actual strength of the relationships among the behaviors. Program planners would do well to examine carefully the details of findings from original sources of research on relations between the specific behaviors with which they are concerned. The health compromising behaviors we have designated as "strongly related" are indeed associated at a very high level by the standards of social science and public health research. Typically, these relationships involve correlations of .35 to .55 and odds ratios of 4.0 to 8.0. Even so, these relationships are far short of perfect.

Consider the implications of our earlier discussion of the strength of these relationships. Adolescents who engage in a serious level of one behavior will typically engage in other closely related behaviors, but at a considerably less serious level. Serious delinquents typically use substances, but far more often only alcohol or marijuana rather than hard drugs. Conversely, though hard drug users are heavily over-represented among serious delinquents, the majority of hard drug users are minor delinquents rather than serious delinquents. Because the base rate of serious levels of each behavior are relatively low, the overlap among even strongly related behaviors will be distinctly limited.

These limitations on the degree of overlap among behaviors would argue against specifically targeting substantial resources on "high risk" or "multi-problem" youths who simultaneously have a large number of problems. Elliott et al.'s (1989) findings indicate that youths who would simultaneously meet criteria for serious levels of three problems they studied are a small proportion of the group who would genuinely need help for one or two of the problems. Setting program eligibility criteria in terms of minimal levels of several simultaneous problems is more likely to exclude deserving clients than to concentrate services on especially needy ones. It is likely that more good would be accomplished by coordinating the delivery of services for different types of problems. This strategy has the potential to provide more adolescents with ready access to the full range of services they need without creating barriers through arbitrary distinctions.

It is unlikely that covariation among health compromising behaviors in adolescence would yield precise prediction in individual level diagnoses. Because the prevalence of serious levels of these behaviors is necessarily low, the presence of one set of behaviors is unlikely to justify confidence in assuming the presence of any others. It may, however, be sufficient information to warrant a more intensive assessment that could verify the presence or absence of such problems. Interestingly, information about one health compromising behavior should more reliably predict the absence of other behaviors than their presence. From the results of Elliott et al. (1989) we can see that youths who do not drink alcohol and do not engage in minor delinquency are very unlikely to become serious drug users.

Even though there is a much higher rate of serious drug use among youths who do use alcohol and engage in minor delinquency, it is still the minority.

A final implication for health services is that theoretical explanations of the source of covariation among health compromising behaviors may prove a useful guide for designing services and prevention programs that would simultaneously address a large group of behaviors. As Osgood et al. (1988) and Donovan and colleagues (Donovan and Jessor, 1985; Donovan et al., 1988) demonstrated, a substantial share of the variation in each of the strongly related subset of behaviors is attributable to a general tendency to engage in problem behavior. Theories of deviance suggest that such a general willingness to violate conventional norms could be addressed by steps such as 1) strengthening social bonds to parents, teachers, and other conventional adults; 2) enhancing opportunities for success, particularly among adolescents who are poorly prepared for school; 3) enhancing parental skills for fair and consistent supervision and discipline; and 4) minimizing association with deviant peer groups.

The second plausible source of covariation among health compromising behaviors in adolescence is individual differences in propensity toward risk-taking. There is much less of a tradition of research and treatment on the theme of risk-taking behaviors, so it is less clear what services would follow from this interpretation. Irwin and Millstein (1986) provide a very useful discussion of potential treatment strategies that would address the risk-taking as a source of health compromising behaviors. They stress that risk-taking is in many ways a manifestation of normal and positive developmental processes. Therefore, treatment and prevention should not attempt to stop all risk-taking, but rather to channel the expression of developmental needs such as autonomy, mastery, and intimacy into forms that do not pose a serious danger to health and future life chances. Irwin and Millstein provide a number of specific recommendations for clinical practice.

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Appendix A

Estimates of Relationships Between Adolescent Health Problems

See Appendix B for descriptions of the samples and measures used in these studies. Data presented in percentages were converted to odds ratios. Data presented in the articles were sometimes grouped into classifications more appropriate to the purposes of the present paper.

Indices of Relationship:

r, Pearson product moment correlation

C, contingency coefficient (Siegel, 1956)

OR, odds ratio (i.e., the odds of problem A in the absence of problem B divided by the odds of problem A in the presence of problem B).

Means are reported when that was the only information provided. It would be preferable to express these in standard deviation units, but standard deviations almost never appeared in these articles.

All relationships reported are statistically significant with $p < .05$ unless indicated (ns).

Tobacco Use and Alcohol Use

Donovan and Jessor, 1985	r = .32, males
Study 2	r = .39, females
Hundleby, 1987	r = .45, males
	r = .50, females
Osgood et al., 1988	r = .32, males
	r = .44, females
Single et al., 1974	r = .30, beer and wine

	r = .40, hard liquor
Weitman et al., 1972	C = .46

Tobacco Use and Marijuana Use

Block and Goodman, 1978	"significant relationship"
Donovan and Jessor, 1985	r = .34, males
Study 2	r = .42, females
Hundleby, 1987	r = .50, males
	r = .50, females
Osgood et al., 1988	r = .39, males
	r = .58, females
Single et al., 1974	r = .43
Weitman et al., 1972	C = .34

Tobacco Use and Use of Other Illicit Drugs

Block and Goodman, 1978	"significant relationship"
Donovan and Jessor, 1985	r = .33, males
Study 2	r = .35, females
Osgood et al., 1988	r = .29, males
	r = .41, females
Single et al., 1974	r's from .18 through .38 for 11 illicit drugs
Weitman et al., 1972	C = .37

Alcohol Use and Marijuana Use

Block and Goodman, 1978	"significant relationship"
Donovan and Jessor, 1985	r = .59, males
Study 2	r = .65, females
Donovan et al., 1988	r = .57, males
	r = .41, females

Hundleby, 1987	r = .45, males
	r = .41, females
Jessor et al., 1980	r = .61, males
	r = .65, females
Osgood et al., 1988	r = .49, males
	r = .47, females
Potvin and Lee, 1980	r = .61, age 13-14
	r = .65, age 15-16
	r = .58, age 17-18
Single et al., 1974	r = .21, beer and wine
	r = .37, hard liquor
Weitman et al., 1972	C = .40
Alcohol Use and Use of Other Illicit Drugs	
Block and Goodman, 1978	"significant relationship"
Donovan and Jessor, 1985	r = .43, males
Study 2	r = .53, females
Osgood et al., 1988	r = .31, males
	r = .35, females
Potvin and Lee, 1980	r = .40, age 13-14
	r = .40, age 15-16
	r = .46, age 17-18
Single et al., 1974	r's from .05 through .18 between beer and wine use and 11 illicit drugs
	r's from .09 through .30 between hard liquor use and 11 illicit drugs

Weitman et al., 1972	C = .31

Marijuana Use and Use of Other Illicit Drugs

Donovan and Jessor, 1985	r = .59, males
Study 2	r = .58, females
Jessor et al., 1980	r = .64, males
	r = .64, females
Osgood et al., 1988	r = .55, males
	r = .53, females
Potvin and Lee, 1980	r = .52, age 13-14
	r = .56, age 15-16
	r = .63, age 17-18
Single et al., 1974	r's from .25 through .78 between marijuana use and 11 illicit drugs
	r's from .25 through .70 among the 11 other illicit drugs
Weitman et al., 1972	C = .58
	C's from .43 through .58 among 5 other illicit drugs

Tobacco Use and Juvenile Delinquency

Donovan and Jessor, 1985	r = .32, males
Study 2	r = .40, females
Hundleby, 1987	r = .45, males
	r = .53, females
Osgood et al., 1988	r = .23, males
	r = .38, females

Alcohol Use and Juvenile Delinquency

Barnes, 1984	Means on delinquency scale

	2.03, abstainers 3.07, light to moderate drinkers 6.41, moderate heavy and heavy drinkers
Donovan and Jessor, 1985 Study 2	r = .46, males r = .52, females
Donovan et al., 1988	r = .53, males r = .45, females
Elliott et al., 1989	OR = 3.37, any alcohol use vs. not; delinquent vs. not
Hundleby, 1987	r = .52, males r = .46, females
Osgood et al., 1988	r = .41, males r = .31, females
Marijuana use and Juvenile Delinquency	
Donovan and Jessor, 1985 Study 2	r = .43, males r = .49, females
Donovan et al., 1988	r = .46, males r = .38, females
Elliott et al., 1989	OR = 4.59, any marijuana use vs. not; delinquent vs. not
Hundleby, 1987	r = .47, males r = .46, females
Jessor et al., 1980	r = .45, males r = .51, females
Osgood et al., 1988	r = .41, males r = .44, females

Use of Other Illicit Drugs and Juvenile Delinquency

Donovan and Jessor, 1985	r = .36, males
Study 2	r = .43, females
Elliott et al., 1989	OR = 6.08, any other illicit drug use vs. not; delinquent vs. not
Osgood et al., 1988	r = .42, males
	r = .38, females

Tobacco Use and Sexual Behavior

Hundleby, 1987	r = .38, males
	r = .51, females
Malcolm and Shephard, 1978	OR = 35.4, males
	OR = 1.3, females
	ever intercourse vs. never; smoker vs. nonsmoker
Tamir et al., 1982	OR = 4.7, males
	OR = 6.5, females
	non-virgin vs. virgin; present smoker vs. never smoker

Alcohol Use and Sexual Behavior

Donovan and Jessor, 1985	r = .24, males, grades 9-11
Study 1	r = .38, males, grades 10-12
	r = .23, females, grades 9-11
	r = .34, females, grades 10-12
Donovan et al., 1988	r = .50, males
	r = .35, females
Hundleby, 1987	r = .45, males
	r = .41, females

Marijuana Use and Sexual Behavior

Donovan and Jessor, 1985	r = .25, males, grades 9-11
Study 1	r = .30, males, grades 10-12
	r = .12(ns), females, grades 9-11
	r = .23, females, grades 10-12
Donovan et al., 1988	r = .35, males
	r = .33, females
Hundleby, 1987	r = .52, males
	r = .48, females

General Substance Use and Sexual Behavior

Ketterlinus et al., 1990	OR = 2.95, males
	OR = 3.51, females
	virgins vs. non-virgins; any illicit drug use vs. not
Zabin et al., 1986	Mean substance use
	Caucasian Males
	6.27, Sexually active
	1.68, Not sexually active
	Black Males
	3.69, Sexually active
	2.08, Not sexually active
	Caucasian Females
	6.96, Sexually active
	2.46, Not sexually active
	Black Females
	3.29, Sexually active
	.58, Not sexually active

Substance Use and Contraception, STDs, Pregnancy, and Parenthood

Elster et al., in press	OR = .86 (ns), urban youth OR = .70 (ns), rural youth alcohol use vs. not; school age mother vs. not OR = 1.64, urban youth OR = 1.61 (ns), rural youth marijuana use vs. not; school age mother vs. not OR = .95 (ns), urban youth OR = 2.32, rural youth other drug use vs. not; school age mother vs. not
Elster et al., 1987	OR = 1.76, black OR = 1.91, hispanic OR = 1.87, non-black, non-hispanic marijuana use vs. not; father before age 19 vs. not OR = 1.32 (ns), black OR = 1.69 (ns), hispanic OR = 1.70, non-black, non-hispanic other drug use vs. not; father before age 19 vs. not
Hingson et al., 1990	Always use condoms vs. not OR = 1.32, abstain from alcohol vs. 5 or more drinks per day OR = 1.67, abstain from marijuana

	vs. at least weekly use OR = 1.88, abstain from other illicit drug use vs. used in past month
Stiffman et al., 1987	OR = 2.37, recent sexually transmitted disease vs. not; substance users vs. low users OR = 4.57, recent sexually transmitted disease vs. not; substance abusers vs. low users OR = 1.39 (ns), recent pregnancy vs. not; substance users vs. low users OR = 1.39 (ns), recent pregnancy vs. not; substance abusers vs. low users
Yamaguchi and Kandel, 1987	OR = 1.26 (ns), premarital pregnancy vs. not; current marijuana use vs. not OR = 1.37 (ns), premarital pregnancy vs. not; former marijuana use vs. not OR = 2.29, premarital pregnancy vs. not; current use of other drugs vs. not OR = 2.55, premarital pregnancy vs. not; former use of other drugs vs. not

Zabin, 1984	Less smoking (approx. 15%) among women obtaining contraceptives prior to first coitus than among women who were already sexually active (approximately 25%)[1]

Tobacco Use and Risk-Taking

Maron et al., 1986	r = -.24, seat belt use
Osgood et al., 1988	r = .13, males, dangerous driving r = .21, females
Williams, 1973	Tobacco use and risk taking Males r = -.24, seat belt use r = .17, chance taking Females r = -.22, seat belt use r = .24, chance taking

Alcohol Use and Risk-Taking

Jessor, 1987	OR = 6.84, males OR = 3.47, females Problem drinker vs. not; never take risks driving in traffic vs. several times
Maron et al., 1986	r = -.16, seat belt use
Osgood et al., 1988	r = .33, males, dangerous driving r = .20, females

Illicit Drug Use and Risk-Taking

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[1] Only approximate percentages can be given because the results appear in a figure, and actual percentages were not reported.

Jessor, 1987	OR = 2.63, males
	OR = 2.63, females
	Current use of marijuana vs. not; never take risks driving in traffic vs. several times
Maron et al., 1986	r = -.24, marijuana and seat belt use
	r = -.15, cocaine and seat belt use
Osgood et al., 1988	Dangerous driving and substance use
	r = .23, marijuana, males
	r = .20, marijuana, females
	r = .20, other drugs, males
	r = .13, other drugs, females
Tobacco Use and School Performance	
Bachman et al., 1981	r = -.24, grades
Donovan and Jessor, 1985	r = -.22, males, grades
Study 2	r = -.24, females, grades
Hundleby, 1987	r = -.25, males, grades
	r = -.25, females, grades
Mensch and Kandel, 1988	Dropout vs. not
	Ever smoked vs. not
	OR = 2.88, males
	OR = 1.95, females
	Smoked in past year vs. not
	OR = 3.70, males
	OR = 3.09, females
	Pack/day in past month vs. not
	OR = 2.69, males

	OR = 2.57, females

Alcohol Use and School Performance

Bachman et al., 1981	r = -.14, grades
Barnes, 1984	r = .24, alcohol consumption and poor grades r = .23, alcohol problems and poor grades
Barnes and Welte, 1986	OR = 3.39, abstainer vs. drinker; mostly A’s vs. mostly F’s Mean ounces alcohol per day, drinkers .52, mostly A’s .61, mostly B’s .86, mostly C’s 1.40, mostly D’s 4.69, mostly F’s
Donovan and Jessor, 1985 Study 2	r = -.25, males, grades r = -.23, females, grades
Donovan et al., 1988	r = -.28, males, grades r = -.39, females, grades
Hundleby, 1987	r = -.12, males, grades r = -.09, females, grades
Mensch and Kandel, 1988	Dropout vs. not Ever drink alcohol vs. not OR = 1.00 (ns), males OR = .55, females Drank in past 30 days vs. not OR = .79, males

	OR = .55, females
Marijuana Use and School Performance	
Bachman et al., 1981	r = -.20
Donovan and Jessor, 1985	r = -.22, males, grades
Study 2	r = -.28, females, grades
Donovan et al., 1988	r = -.28, males, grades
	r = -.25, females, grades
Hundleby, 1987	r = -.19, males, grades
	r = -.12, females, grades
Jessor et al., 1980	r = -.16, males, grades
	r = -.14, females, grades
Mensch and Kandel, 1988	Dropout vs. not
	Ever use marijuana vs. not
	OR = 1.65, males
	OR = 1.29, females
	Used marijuana past year vs. not
	OR = 1.70, males
	OR = 1.21, females
	Used marijuana 100 times vs. not
	OR = 2.25, males
	OR = 1.84, females
Use of Other Illicit Drugs and School Performance	
Bachman et al., 1981	r = -.15, grades
Donovan and Jessor, 1985	r = -.14, males, grades
Study 2	r = -.15, females, grades
Mensch and Kandel, 1988	Dropout vs. not
	Ever use cocaine vs. not

OR = 1.39, males
OR = 1.47, females
Used cocaine past year vs. not
OR = 1.37, males
OR = 1.00 (ns), females
Ever use other drugs vs. not
OR = 1.61, males
OR = 1.48, females
Used other drugs past year vs. not
OR = 1.58, males
OR = 1.24, females
Used other drugs 40 times vs. not
OR = 2.11, males
OR = 1.99, females

Substance Use and Problem Behavior at School

Bachman et al., 1981	r = .25, tobacco and truancy r = .33, alcohol and truancy r = .40, marijuana and truancy r = .34, other drugs and truancy
Barnes and Welte, 1986	OR = 11.32, abstainer vs. drinker; no school misconduct vs. more than 10 incidents Mean ounces alcohol per day, drinkers No school misconduct .45, males .27, females .27, Oriental

	.23, Hispanic .12, West Indian .38, White More than 10 incidents of school misconduct 1.63, males 1.04, females 1.64, Oriental 1.64, Hispanic 1.37, West Indian 1.40, White
Substance Use and Suicide	
Kandel et al., in press	r = .05 (ns), males r = .37, females drug involvement and suicidal ideation
Robbins and Alessi, 1985	r = .17 (ns), drug abuse and suicidal tendencies r = .32, drug abuse and number of suicide gestures r = .24 (ns), drug abuse and seriousness of suicide intent r = .25, drug abuse and medical lethality of attempt
Shaffii et al., 1985	OR = 7.39, frequent use of non-prescribed drugs or alcohol; suicide victim vs. control

Stiffman et al., 1987	OR = 1.83, suicidal ideation vs. not; substance users vs. low users OR = 4.44, suicidal ideation vs. not; substance abusers vs. low users
Substance Use and Mental Health	
Barnes, 1984	r = .11 (ns), psychological adjustment and alcohol consumption r = -.03 (ns), psychosomatic illness and alcohol consumption r = -.13 (ns), psychological adjustment and alcohol related problems r = -.03 (ns), psychosomatic illness and alcohol related problems
Elliott et al., 1989	Mental health problem vs. not OR = 1.24 (ns), alcohol use vs. not OR = 1.69, marijuana use vs. not OR = 2.43, other drug use vs. not
Fejer and Smart, 1972	"Differences in anxiety scores between users and non-users of each drug were significant." Specific results were not presented. Receiving psychological treatment vs. not OR = 2.52, tobacco user vs. not OR = 1.83, alcohol user vs. not

	OR = 4.88, marijuana user vs. not OR's 3.94 through 6.75 for seven other illicit drugs
McLaughlin et al., 1985	Alcohol use and emotional maladjustment r = .16, males, 7th grade r = .11 (ns), females, 7th grade r = .13 (ns), males, 10th grade r = .03 (ns), females, 10th grade
Paton and Kandel, 1978	Cannabis use vs. not; depressed vs. not OR = 1.35, males OR = 2.08, females OR = 1.76, White OR = .91 (ns), Black OR = 1.16 (ns), Puerto Rican
	Cannabis and other drug use vs. not; depressed vs. not OR = 1.46, males OR = 2.30, females OR = 1.76, White OR = 1.07 (ns), Black OR = 1.16 (ns), Puerto Rican
Paton et al., 1977	Marijuana use vs. not; depressed vs. not OR = 1.49, wave 1 OR = 1.42, wave 2

	Multiple drug use vs. marijuana use only; depressed vs. not OR = 1.20, wave 1 OR = 1.58, wave 2
Stiffman et al., 1987	Users vs. low users OR = 1.53 (ns), symptoms of anxiety vs. not OR = 1.42 (ns), symptoms of post-traumatic stress vs. not OR = 4.09, any depressive symptoms vs. not OR = 2.09, lifetime diagnosis of depression vs. not Abusers vs. low users OR = 2.67, symptoms of anxiety vs. not OR = 2.70, symptoms of post-traumatic stress vs. not OR = 5.70, 3 or more depressive symptoms vs. not OR = 4.44, lifetime diagnosis of depression vs. not
Swaim et al., 1989	r = .21, substance use and anger r = .09 (ns), substance use and blame-alienation r = .10, substance use and anxiety r = .05 (ns), substance use and

	depression
Juvenile Delinquency and Sexual Behavior	
Donovan and Jessor, 1985	r = .36, males, grades 9-11
Study 1	r = .37, males, grades 10-12
	r = .41, females, grades 9-11
	r = .29, females, grades 10-12
Donovan et al., 1988	r = .35, males
	r = .22, females
Hundleby, 1987	r = .46, males
	r = .42, females
Ketterlinus et al., 1990	OR = 1.52, males
	OR = 1.44, females
	virgin vs. non-virgin; theft vs. not
	OR = 1.68, males
	OR = 1.64, females
	virgin vs. non-virgin; personal violence vs. not
Miller and Simon, 1974	OR = 11.31, males
	OR = 4.32, females
	coital experience vs. not; moderately high to very high delinquent involvement vs. none to moderate delinquent involvement
Juvenile Delinquency, Contraception, Pregnancy, and Parenthood	
Elster et al., in press	OR = 2.11, urban youth
	OR = 2.20 (ns), rural youth

	runaway vs. not; school age mother vs. not
	OR = .75 (ns), urban youth
	OR = 1.32 (ns), rural youth
	theft < $50 vs. not; school age mother vs. not
	OR = .94 (ns), urban youth
	OR = .79 (ns), rural youth
	shoplifting vs. not; school age mother vs. not
	OR = .82 (ns), urban youth
	OR = 1.02 (ns), rural youth
	damaging property vs. not; school age mother vs. not
	OR = 2.07, urban youth
	OR = 1.37, rural youth
	fighting vs. not; school age mother vs. not
Elster et al., 1987	OR = 1.45 (ns), Black
	OR = .69 (ns), Hispanic
	OR = 1.38 (ns), non-Black, non-Hispanic
	Shoplifted vs. not; father before age 19 vs. not
	OR = 1.32 (ns), Black
	OR = 1.84, Hispanic
	OR = 2.33, non-Black, non-Hispanic

Hit or threatened to hit someone vs. not; father before age 19 vs. not

OR = 1.99, Black

OR = 2.51, Hispanic

OR = 2.52, Non-Black, non-Hispanic

Ever charged with illegal activity vs. not; father before age 19 vs. not

Pirog-Good, 1988

Offense rate per 1,000 population

Age

14	15	16	17	
197	375	264	197	White Fathers
205	293	321	199	Black Fathers
30	61	81	79	Other Whites
57	102	171	148	Other Black

Juvenile Delinquency and Risk Taking

Jessor, 1987

Mean delinquency past 6 months

Males	Risk taking in traffic
6.6	Never
11.9	Once or Twice
22.7	Several Times

Females	Risk taking in traffic
7.9	Never
11.3	Once or Twice
16.1	Several Times

Osgood et al., 1988

r = .34, males, dangerous driving

	r = .23, females, dangerous driving

Juvenile Delinquency and School Performance

Donovan and Jessor, 1985	r = -.28, males, grades
Study 2	r = -.28, females, grades
Donovan et al., 1988	r = -.30, males, grades
	r = -.24, females, grades
Hundleby, 1987	r = -.21, males, grades
	r = -.21, females, grades
Mensch and Kandel, 1988	OR = 2.47, males
	OR = 2.31, females
	Dropout vs. not; no delinquent acts vs. 3 or more

Juvenile Delinquency and Suicide

Kandel et al., in press	r = .20, males
	r = .32, females
	delinquency and suicidal ideation
Robbins and Alessi, 1985	Anti-social behavior
	r = .01 (ns), suicidal tendencies
	r = -.02 (ns), number of suicide gestures
	r = .05 (ns), seriousness of suicide intent
	r = .01 (ns), medical lethality of attempt
Shafii et al., 1985	OR = 7.39, antisocial behavior vs. not; suicide victim vs. control

Juvenile Delinquency and Mental Health

Elliott et al., 1989	OR = 1.72, mental health problem vs. not; delinquent vs. not Mean Number of Depressive Symptoms .66, non-delinquents .93, exploratory delinquents .86, nonserious delinquents 1.05, serious delinquents OR = 1.54, use of mental health services vs. not; non-delinquent vs. serious delinquent

Adolescent Sexuality and Risk-Taking

Jessor, 1987	risky driving frequency of intercourse r = .22, males r = .06 (ns), females use of contraceptives r = -.19 (ns), males r = -.18 (ns), females

Adolescent Sexuality and School Performance

Donovan and Jessor, 1985 Study 1	Sexual intercourse and grades r = -.37, males, grades 9-11 r = -.13 (ns), males, grades 10-12 r = -.04 (ns), females, grades 9-11 r = -.08 (ns), females, grades 10-12

Donovan et al., 1988	r = -.27, males r = -.36, females sexual intercourse and grades
Hundleby, 1987	r = -.18, males r = -.11, females sexual behavior and grades
Mensch and Kandel, 1988	OR = 4.50, males OR = 5.28, females dropout vs. not; intercourse before 19 vs. not OR = 7.09 dropout vs. not; pregnant before 19 vs. not
Yamaguchi and Kandel, 1987	Premarital pregnancy vs. not OR = 2.59, drop-out vs. not OR = 1.42, C grades vs. A&B OR = 3.74, D or below grades vs. A&B

Adolescent Sexuality and Problem Behavior at School

Elster et al., in press	OR = 3.40, urban youth OR = 2.06, rural youth suspended vs. not; school age mother vs. not OR = 1.28, urban youth OR = 1.33 (ns), rural youth truant vs. not; school age mother vs. not

Elster et al., 1987	OR = 2.56, Black OR = 1.96, Hispanic OR = 4.75, Non-Black, Non-Hispanic suspended or expelled vs. not; father before age 19 vs. not
Ketterlinus et al., 1990	OR = 3.52, males OR = 3.20, females virgin vs. non-virgin; suspended or expelled vs. not
Yamaguchi and Kandel, 1987	OR = 1.50, premarital pregnancy vs. not; former school absentee vs. not
Risk-taking and School Performance	
Maron et al., 1986	r = .22, grades and seat belt use
The School and Suicide	
Kandel et al., in press	A grade average vs. not No suicidal ideation vs. some OR = 1.18 (ns), males[2] OR = 2.17, females No suicidal ideation vs. high OR = 1.67 (ns), males OR = 1.22, females No suicidal ideation vs. some OR = 1.09 (ns), males OR = 1.99, females No suicidal ideation vs. high

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[2] Significance test is actually between all 3 groups: none vs. some vs. high suicidal ideation.

	OR = 1.56 (ns), males OR = 3.31, females

School Performance and Mental Health

Barnes, 1984	r = .22, psychological adjustment r = -.28, psychosomatic illness

Suicide and Mental Health

Kandel et al., in press	r = .42, males r = .53, females depressive symptoms and suicidal ideation r = .22, males r = .39, females eating problems and suicidal ideation Mean number of times seen by M.D. for mental health problems

Males	Suicidal Ideation
.08	None
.94	Some
1.43	High

Females	Suicidal Ideation
.21	None
.93	Some
1.29	High

Robbins and Alessi, 1985	Depression r = .57, suicidal tendencies r = .45, number of suicide

	gestures r = .56, seriousness of suicide intent r = .49, medical lethality of attempt
Shafii et al., 1985	OR = 6.04, inhibited personality vs. not; suicide victim vs. control OR = 2.66, psychiatric treatment vs. not; suicide victim vs. control

Appendix B

Studies of Concurrent Covariation Among Adolescent Health Problems

Bachman, Johnston, and O'Malley, 1981.

Sample. A national probability sample of approximately 15,500 high school seniors in the United States.

Measures. The measure of tobacco use reflected lifetime use, ranging from never through regular current use. Alcohol, marijuana, and other illicit drug use were assessed for the past 12 months. High school grades measured school performance. The index of problem behavior at school was truancy during the past four weeks.

Barnes, 1984.

Sample. A probability sample of 124 adolescents aged 12-17 in Erie County, New York.

Measures. Current consumption of alcohol in ounces per day, and frequency of alcohol related problems in the past year. Frequency of 10 delinquent acts in the past year (labeled major deviance). The measures of psychological adjustment and psychosomatic illness were not described.

Barnes and Welte, 1986.

Sample. A representative sample of 27,335 students in grades 7-12 in New York state.

Measures. Alcohol use was defined first as a dichotomy between drinkers and abstainers (less than one drink a year) and second as average daily consumption of ounces of alcohol (assessed only for drinkers). School performance was defined in terms of grades, and school misconduct in terms of cutting classes, being sent to the principal, or having home called because of conduct during the current school year.

Block and Goodman, 1978.

Sample. Over 9,048 students aged 12-18 from 79 schools in 10 U.S. cities. No information is given about how these schools were chosen, and the authors do not claim that the sample is representative.

Measures. Lifetime and current use of a large number of licit and illicit substances.

Donovan and Jessor, 1985.

This article reports results from two studies, the first with a local sample and the second with a national sample. In cases where the content of the two overlapped, we have used results from the national sample in preference to the local sample.

Study 1

Sample. Students selected from three junior high schools in a small Colorado city. The data reported come from the third year (grades 9 through 11) and fourth year (grades 10 through 12) of data collection from 141 females and 102 males.

Measures. Measures included alcohol use defined as number of times drunk in the past year, marijuana use in the past six months, lifetime frequency of sexual intercourse, a 26 item measure of delinquency, and grade point average as an indicator of school performance.

Study 2

Sample. A national probability sample of students in grades 11 and 12, including 1,444 females and 1,208 males.

Measures. Measures included tobacco use defined as number of cigarettes per day in the last month, alcohol use defined as times drunk in the past year, frequency of marijuana use in the past six months, a twelve item index of delinquency in the past year, and school grades as a measure of performance.

Donovan, Jessor, and Costa, 1988.

Sample. 162 males and 226 females, grades 11 and 12 from a single school district in Colorado.

Measures. Alcohol use was measured in terms of the number of times drunk in the past six months, marijuana use in terms of frequency in the past six months, delinquency in terms of the frequency of 10 behaviors over the past six months, sexual behavior in terms of virgin vs non-virgin status, and school performance in terms of grades in the preceding academic year.

Elliott et al., 1989.

Sample. A national probability sample of 1687 U.S. adolescents age 11-17. The figures reported in Appendix A are from the first wave of data collection, in 1976, except for depressive symptoms and use of mental health services, which were only available in 1983.

Measures. Alcohol, marijuana, and other illicit drug use were assessed for the prior year, as were a large number of delinquent behaviors. The classification of delinquent vs. non-delinquent used in Appendix A contrasts Elliott et al.'s categories of serious and nonserious delinquents (i.e., 11 or more offenses or 2 or more index offenses) with nondelinquents and exploratory delinquents. Mental health problems were primarily defined by a combination of items concerning social isolation and emotional problems, and also by a list of depressive symptoms (from the NIMH-DIS) and the use of mental health services.

Elster et al., in press.

Sample. A national probability sample of 1,263 urban and 388 rural females 15-17 years of age in 1980 in the U.S. (drawn from the National Longitudinal Survey of Youth).

Measures. An interview in 1985 ascertained whether respondents had become mothers by age 18. Other data came from the 1980 interview, which could be either before, during, or after the pregnancy. The remaining measures referred to behavior or events during the past year (dichotomized ever vs. never): drinking alcohol, smoking marijuana, using other drugs, several forms of delinquency, school suspension, and truancy.

Elster, Lamb, and Tavare, 1987.

Sample. A national probability sample of 367 males aged 15 to 22 who reported fathering a child before age 19 and 1000 who did not (drawn from the National Longitudinal Survey of Youth). The sample included 397 blacks, 212 hispanics, and 755 non-black, non-hispanics.

Measures. Smoking marijuana, using other illicit drugs, and several delinquent acts classified dichotmously in reference to behavior during the past year. Problem behavior at school indicated by ever being expelled or suspended from school, and delinquency also measured as ever being charged with an offense. Note that respondents could have become fathers at any time before the interview, up to age 19. All other measures reflected current status, which might be concurrent with or several years after becoming a father.

Fejer and Smart, 1972.

Sample. This study included samples from three areas in Ontario, Canada: grades 9-13 in Haldiman County (N=2507), grades 7, 9, 11, and 13 in Metropolitan Toronto (N=6890), and grades 9-13 in Niagara County (N=5900).

Measures. Use of a number of licit and illicit drugs was reported for the prior 6 months. Mental health was assessed through a short version of the Taylor Anxiety Scale, questions about psychological problems, and questions about whether respondents "had ever received consultation or been treated for psychological problems; the question referred to treatment at any time, not necessarily the present."

Hingson et al., 1990.

Sample. A probability sample of 1,773 16-19 year olds from Massachusetts. Most comparisons were reported only in terms of extreme groups (e.g., abstainers vs. people who average five or more drinks per day). Most analyses were limited to the 61% of the sample that was sexually active in the past year.

Measures. Alcohol, marijuana, and other drug use were measured by single items, which apparently specified use over varying recent time periods. Contraception was assessed in terms of frequency of condom use (always, sometimes, or never).

Hundleby, 1987.

Sample. A probability sample of 9th grade students in Ontario, 1008 males and 1040 females.

Measures. Frequency of use in past year was assessed for tobacco, marijuana, and alcohol. The measures of sexual behavior and delinquency were factor scores based on items referring to behavior during the past year. The measure of sexual behavior included petting and dating, as well as actual intercourse.

Jessor, 1987.

Sample. All members of the sample from Donovan et al., 1988, who were over 16.5 years old; 150 males and 220 females.

Measures. Alcohol use assessed in terms of number of times drunk in the past six months and number of negative consequences from drinking in the past six months. Marijuana use was assessed as frequency of use in the past six months. The measure of risk-taking reported here is an item asking the frequency of taking "some risks when driving in traffic because it makes driving more fun." We do not report findings from the "risky driving scale" because it includes items involving substance use (which would lead to a spurious correlation with those measures).

Jessor, Chase, and Donovan, 1980.

Sample. A national probability sample of over 10,000 students in grades 7-12 in the U.S. This sample overlaps with that of Donovan and Jessor's (1985) Study 2.

Measures. Alcohol use was defined in terms of frequency of being drunk in the past year. The index of marijuana was a guttman scale combining lifetime use, current use, and maintaining a supply. The measure of other drug use includes psychedelics, amphetamines, and barbiturates (time frame not specified). The measure of delinquency appears to be the same as used by Donovan and Jessor (1985), and grade point average indexed school performance.

Kandel et al., in press.

Sample. 593 9th and 11th grade student at a public high school in a large city.

Measures. Drug use was assessed as stage of drug involvement coded from amount of use of several specific substances in the past year. Delinquency was assessed through a scale based on frequency of 17 behaviors in the past year. The measure of suicidal ideation was based on four items, and answers were coded into a three point scale. Depressive symptoms were assessed through a six-item scale. A 19 item scale measured eating problems. Mental health problems were also measured in terms of the number of times the respondent had seen a physician for mental illness. An item about cutting class reflected problem behavior at school, and school performance was ascertained in terms of whether or not a student had a grade average of A.

Ketterlinus et al., 1990.

Sample. A subsample of the National Longitudinal Survey of Youth (a national probability sample of the U. S.), comprised of all white and black youth who were 15-17 years old in 1980. There were 1917 males and 1834 females.

Measures. Sexual behavior was assessed as a trichotomy between virgins, sexually active non-parents, and parents. Results in Appendix A combine the two sexually active categories. All other measures were dichotomies between "ever" or "never" for the past year. Being suspended or expelled defined problem behavior at school, theft (theft < $50 or shoplifting) and personal violence (fought or threatened to harm others) defined juvenile delinquency, and smoking marijuana or using other drugs defined substance illicit drug use.

Malcolm and Shephard, 1978.

Sample. 77 males and 58 females from 3 inner city and 2 suburban high schools, 14 to 17 years old.

Measures. One cigarette a day was the criterion for being designated a smoker. Sexual behavior was measured in terms of frequency of intercourse.

Maron et al., 1986.

Sample. 1365 10th graders from four high schools in same county of California.

Measures. The measure we interpret as risk taking is a two item index of frequency of seat belt use. Frequency of cigarette smoking, marijuana use, drunkenness, and cocaine use were also assessed (time frame not specified). School performance was assessed through grades.

McLaughlin et al., 1985.

Sample. The sample was limited to white students from a school district on the periphery of Houston. There were 172 boys and 221 girls from 7th grade science classes and 131 boys and 164 girls from 10th grade health classes.

Measures. Alcohol use was measured by mean response to 4 questions: frequency of drinking (past month, past year, and lifetime) and quantity consumed. Emotional maladjustment was measured by 6 items: depressive affect, anxiety, obsessiveness, social withdrawal, hopelessness, and feelings of unreality.

Mensch and Kandel, 1988.

Sample. Based on the National Longitudinal Survey of Youth, a national probability sample of over 12,000 respondents in the U.S., age 14-21 in 1979.

Measures. Using data through 1984, drop out was defined as an interruption in high school education, even if an individual later completed high school. Cigarette, alcohol, marijuana, cocaine, and other illicit drug use was assessed for the past year in the 1984 interview. Delinquency was defined by the number acts committed (out of 17 possible) during the year preceding the 1980 interview. Sexual behavior was assessed in terms of age of first intercourse and age of first pregnancy (for females only). The timing of assessment of delinquency in relation to drop out is ambiguous, and the assessment of drug use came after drop out.

Miller and Simon, 1974.

Sample. Probability sample of 2,064 adolescents in Illinois, age 14-17.

Measures. Sexual behavior was defined in terms of coital experience (i.e., virgin vs.

non-virgin). Delinquency was assessed through a 32 items, for which the time frame and response categories were not described.

Osgood et al., 1988.[1]

Sample. This sample is derived from the follow-up portion of the Monitoring the Future study. These data come from national probability samples of white students in the senior classes of 1976-1980, with a weighted sample size of 321 males and 390 females.

Measures. Tobacco use was assessed for the past 30 days, and heavy alcohol use was assessed as the frequency of having 5 or more drinks at the same occasion over the past two weeks. Use of marijuana and other illicit drugs was indexed by frequency of use in the past year. The measure of delinquency was based on 14 items concerning behavior in the past year, and the index of dangerous driving combined reports of traffic accidents and traffic tickets in the past year.

Paton and Kandel, 1978.

Sample. A probability sample of 8,206 secondary school students in New York state.

Measures. Based on questions concerning lifetime use of 11 illegal substances, respondents were classified as nonusers of illicit drugs, users of cannabis only, and multiple drug users. Depressive mood was measured by a 6 item scale.

Paton, Kessler, and Kandel, 1977.

Sample. 5,468 students who were a subsample from the Paton and Kandel study who could be matched in two waves of data collection.

Measures. Current drug use was defined as use in the preceding 30 days. Depressive mood was measured by a 6-item scale.

Pirog-Good, 1988.

Sample. 333 unwed, adolescent (below age 18) fathers named in paternity suits in

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[1] The specific correlations presented in here did not appear in the published paper, but these figures were obtained as part of the analysis reported there.

Marion County, Indian between 1978 and 1984. Of this group, 76% were black. The comparison group was all adolescents in this county born in 1965 and 1966.

Measures. Parenthood was defined by the existence of a paternity suit. The authors state that the vast majority of these suits result from the mothers' application for AFDC and Medicaid benefits. Delinquency was defined by juvenile court records of arrest at any time up to (but not including) age 18.

Potvin and Lee, 1980.

Sample. A national probability sample of 416 13 and 14 year olds, 391 15 and 16 year olds, and 314 17 and 18 year olds.

Measures. Use of alcohol, marijuana, and other illicit drugs was assessed for the past year.

Robbins and Alessi, 1985.

Sample. 64 adolescents at a hospital psychiatric unit, 13-18 years old. Half had made suicide attempts.

Measures. All variables assessed through structured clinical interviews, and specific definitions of the variables were not presented.

Shafii et al., 1985.

Sample. 20 completed suicides age 12-19, and 17 matched controls. Matching procedures were not described.

Measures. All variables assessed through structured clinical interviews, and specific definitions of the variables were not presented.

Single, Kandel, and Faust 1974

Sample. A probability sample of 8,206 secondary school students in New York state. (See Paton and Kandel, above.)

Measures. The analyses of interest here were based on whether or not respondents had ever (in their lifetime) used alcohol, cigarettes, marijuana, or any of 11 other illicit drugs.

Stiffman et al., 1987.

Sample. 2,785 adolescents age 13-18 attended medical clinics serving communities with high rates of adolescent social and health problems in 10 U.S. cities.

Measures. All variables were assessed through fixed-format interviews. With regard to substance use, respondents were classified as non-users (infrequent drug or alcohol use), users, or abusers (according to DSM-III diagnostic criteria). The same interview yielded medical information about pregnancy and sexually transmitted diseases and about various mental health problems. None of the measures used definite time frames.

Swaim et al., 1989.

Sample. 563 11th and 12th graders from two high schools in two mid-sized communities in the Southwestern U.S.

Measures. Drug use was assessed through a measure combining four questions about use of each of eleven drugs to form a classification among eight drug use types. Mental health was assessed through measures of blame-alienation (7 items), anxiety (3 items), depression (5 items) and anger (5 items).

Tamir, Wolff, and Epstein, 1982.

Sample. 804 high school students in Haifa, Israel., 16-18 years old. The selection of the sample is not described.

Measures. The measures are not described.

Weitman et al., 1972.

Sample. 2,634 high school age adolescents of Portland and metropolitan Multnomah County, Oregon.

Measures. All measures were defined dichotomously, apparently with reference to lifetime use. Tobacco use was defined as daily use, and alcohol use as 15 or more occasions. Any use was the criterion for marijuana and any use of cocaine, hallucinogens, narcotics, or barbiturates was the criterion for other illicit drugs.

Williams, 1973.

Sample. 386 9th grade students in a public high school in a predominantly middle and upper middle class suburb of Boston, Massachusetts.

Measures. Chance taking was measured with a single item asking respondents to compare themselves to others their age about how many chances they take. A single question assessed seat belt use. "Smokers" were respondents who reported smoking cigarettes one or more days out of the past 7.

Yamaguchi and Kandel, 1987.

Sample. 706 females from a probability sample of 10th and 11th graders from New York State public high schools in 1971-1972, reinterviewed in 1980-1981.

Measures. The paper focuses on premarital pregnancy, which may or may not have been during adolescence. (The possible age range was 14 - 26.) Though all data were collected at the same time, they are based on monthly time charts over a nine year period. The analysis related the occurrence of a pregnancy to current or former marijuana use, to current or former use of other drugs, and earlier high school drop out.

Zabin, 1984.

Sample. 1,200 young women attending 32 contraceptive clinics in the U.S., under age 20. (Mean age 16.9)

Measures. Tobacco use was assessed in terms of current frequency of cigarette smoking. Contraceptive behavior was defined in terms of whether clinic attendance was in preparation for first coitus or some time after.

Zabin et al., 1986.

Sample. Over 2,500 junior and senior high school students from four inner city schools in Baltimore, Maryland.

Measures. An index of substance use combined lifetime and past month use for cigarettes, alcohol, marijuana, and other drugs. In addition to dichotomous variables for being sexually active and ever being pregnant or impregnating, females' contraceptive behavior was indirectly indexed by whether they delayed attending a family planning clinic for more than a year after becoming sexually active.

LEGAL AND ETHICAL ISSUES RELATED TO ADOLESCENTS' PARTICIPATION IN RESEARCH AND DATA COLLECTION ON HEALTH AND RELATED TOPICS

Background Paper for United States Congress
Office of Technology Assessment
Adolescent Health Project

Prepared under contract to the Carnegie Council
on Adolescent Development

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XIV. Summary

I. Definitions

[a] Biomedical research is defined as a class of activities solely designed to develop or contribute to generalizable knowledge. Medical practice refers to a class of activities designed to enhance the wellbeing of an individual. Practice, in turn, consists of two subsets. "Customary practice" is the currently accepted method of treating a patient's problem. "Non-validated practice" may include application of novel procedures or interventions performed in the course of rendering treatment.

By definition, research is never intended to benefit the particular subject. If benefit is intended, the intervention is non-validated practice. If for example, a patient is given an investigational drug to attempt to alleviate an illness, the giving of the drug is practice. The extra tests such as blood drawing for analysis of the pharmaceutical effects are research on the drug, not on the patient.[1]

As a result of the difference between the motivations for research and practice, there is an important difference in the rules for informed consent as they apply to the two activities. While there may be instances in the practice of medicine where the concept of "therapeutic privilege" -- failing to inform a patient fully on the grounds that his or her condition would be materially worsened by being given the information -- can be justified,[2] this is not possible in the context of research.[3]

[b] We adhere to the definitions of categories of minors -- mature, emancipated, etc. --- presented in the paper by Gittler,

Quigley-Rick and Saks. For our purposes, a "young adolescent" is one aged 10-14 and an "adolescent" or "mature minor" is one aged 15-18. We would, however, like to point out that these distinctions appear to have little practical impact in terms of malpractice liability; it has been at least 45 years since there has been a reported case in this country in which parents have received damages for non-negligent treatment of their minor child without their consent.[4]

II. Background of the Regulation of Human Subjects Research

[a] Nazi Experiments

After World War II, German physicians were tried as war criminals after the Allied Forces discovered the "research" atrocities they had committed in concentration camps. From those horrors came the Nuremberg Code[5] and later the Declaration of Helsinki,[6] designed to prevent human abuse by obtaining the free and uncoerced informed consent of all human subjects of research. The United States government took the position that no abuse of humans could possibly happen in this country.

[b] Research Problems in the United States

In the late 1960's, however, several egregious violations of human rights in the name of "research" were discovered in the United States.[7]

The first discovery was the Tuskegee syphilis study, carried out by the United States Public Health Service itself. In 1932, at a time when there was no effective treatment for syphilis, physicians began to study 400 black males in Alabama, most of whom were illiterate, who had the disease. They studied "the natural history" of the disease by observing the men to see what happened to them. The men were not told that they were research subjects; in fact they were told that they were receiving "special treatments." When penicillin became available as an effective treatment for the disease, it was not offered to these men; observation without intervention continued. In 1972 details of the project were published in the national press and public outrage began.[8]

The second became known as the Jewish Chronic Disease Hospital study, in which researchers injected live cancer cells into elderly patients, most of whom were senile, in a nursing home. The researchers wished to discover if the malignant cells would be rejected. The patients were told nothing about the experiments. The study became public knowledge when a board member of the institution sued to obtain the records of the patients involved in order to determine if they had been injured.[9]

The third episode to come to public attention was "the Willowbrook study." Willowbrook is a large New York state hospital for mentally retarded children and adults. In the 1950's and 1960's it was overcrowded and understaffed and so filthy that hepatitis was endemic among its patients. Researchers vaccinated children on their admission to the institution and then infected them with hepatitis to determine if the vaccine were effective. Most of the parents admitting their children consented once the researchers told them that the children would get the disease anyway when they mingled with the general hospital population. The adults who worked at Willowbrook and, of course, were equally exposed, were never asked to be research subjects. Even more distressing, basic cleanliness in the institution would have eliminated the disease. Although the vaccination proved to be effective and an important advance in medicine, at the time the retarded children were vaccinated, there was no way to be sure what the effects might be. When this research was published[10] many commentators felt that the investigators had violated ethical standards.[11]

[c] Development of Research Regulations

As a result of concerns in the late 1950's and early 1960's about the ethics of drug development as well as the narrow escape from approval of thalidomide in this country, the Food, Drug and Cosmetics Act was amended in 1962[12] to require that companies provide proof of efficacy as well as safety before a drug would be approved for sale. The same statute required that human subjects in drug trials had the right to give informed consent and to refuse to participate if they chose.

As a result of increasing public outrage at a seeming lack of justice and fairness, at least in the selection of human subjects in the research enterprise, in 1974 Congress enacted and President Nixon signed the National Research Act.[13]

That Act established the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. The Commission, composed of experts in research, lawyers, ethicists and members of the public, was mandated to study the problems of biomedical research in general and to suggest to the Secretary of Health, Education and Welfare (as the Department of Health and

Human Services was then known) what ethical principles should be applied in research funded by or performed under the direction of the federal government. The Commission was also specifically mandated to consider the ethical and regulatory issues involved in research on fetuses, children, prisoners and the hospitalized mentally ill or mentally retarded patient.

The Commission issued significant studies on general principles of research ethics[14] as well as specific reports on the peculiarly vulnerable populations it had been asked to study. Most of the recommendations submitted with the reports were accepted by the Secretary of DHEW and are now required in any research study funded or sponsored by the federal government or in which the results of the studies will be submitted to any agency of the federal government (such as drug studies submitted to the Food and Drug Administration.)

In 1978 Congress created another Commission, which came to be known as the President's Commission, to consider the major ethical issues in medical practice as well as research. The President's Commission was created as a short-term body. The expiration date given in the original statute was December 31, 1982, although an amendment continued the life of the Commission to March 31, 1983.[15] The Commission published nine reports, some of which dealt with basic issues in the provision of health services, but many of which dealt with research questions and problems.

III. Institutional Review Boards

An Institutional Review Board (IRB) is a committee established within an institution in which research with human subjects is undertaken.[16] The committee is charged with the responsibility of protecting the rights and welfare of human subjects. Before approving the research plan (known as a protocol), the committee determines that the risks of research are balanced by reasonably foreseeable benefits, that the research cannot be done with less risk to humans, and that the prospective subject is sufficiently informed to be able to give knowledgeable consent to participate. The committee also assures that people are not coerced to participate and that people who may be particularly vulnerable to exploitation (i.e., the retarded, the impoverished, the dying) are not selected unless it is necessary to include them in the subject population.

[a] History of Institutional Review Boards

During the 1960's and early 70's and concurrently with the growing public outrage about the conduct of biomedical research on vulnerable populations, the biomedical establishment itself had begun to rely on peer review mechanisms to review the ethical aspects of human subjects research.[17]

As long ago as 1953, intramural research at the Clinical Research Center of the National Institutes of Health was submitted for group review prior to its commencement. Some medical centers also created human subjects committees long before there were regulatory requirements that they do so.[18]

In 1966 the Surgeon General required that no research grants from the United States Public Health Service be given until the research protocol for which funding was being sought had been reviewed by a committee of the grantee's institution to determine that the rights and welfare of the individuals involved received adequate protection, the methods used to secure informed consent were appropriate and, in particular, that the risks and benefits of the projects were adequately explained to prospective subjects.[19] The USPHS also required institution-wide assurance of compliance with those regulations for all USPHS research funded within a single institution. These "institutional assurances" were required to describe the composition of the review committee.

By 1969 the policies required that review committees have members whose primary concerns were not those of researchers.[20] Each committee was required to include persons knowledgeable about law, ethics and community perspectives.

In 1975 these policies were issued as regulations by the Department of Health, Education and Welfare.[21] In addition to requiring a diversity of membership, the regulations provided that no Institutional Review Board -- as these groups by now had been termed -- should be composed entirely of employees of the institution.

In 1981, based on the report on Institutional Review Boards of the National Commission,[22] both the Department of Health and Human Services and the Food and Drug Administration revised their regulations on the protection of human subjects.[23]

The federal government has no authority to require IRB review of research with which the government has no involvement.[24] The Department of Health and Human Services requires review of research conducted by DHHS or funded in whole or in part by a Department grant, contract, cooperative agreement or fellowship.[25] The Food and Drug Administration requires review of all clinical investigations regulated by it as well as clinical investigations that support applications for research or marketing permits for products regulated by the FDA, including food and color additives, drugs for human use, medical devices for human use, biological products for human use and electronic products such as pacemakers.[26] Most private foundations and other funding agencies (for example, The March of Dimes) require compliance with federal standards and hence IRB review for any research that they fund.

Most biomedical research institutions, concerned on ethical grounds with protection of human subjects as well as concern about possible "malresearch" suits if a research subject is injured, require IRB review of all research done on their premises, research dependent for its access to subjects on the institution's records, and research, no matter where conducted, if the investigator is a member of its faculty, staff or student body. Thus even though the federal government may not be able to require it, it is clear that almost all consequential clinical research is reviewed by IRBs.

[b] Criteria for Review

In order to approve research covered by federal regulations, the IRB must determine that all of the following requirements are satisfied:[27]

(1) Risks to subjects are minimized by using procedures which are consistent with sound research design and which do not unnecessarily expose subjects to risks and whenever appropriate,

by using procedures already being performed on the subjects for diagnostic or treatment purposes.

(2) Risks to subjects are reasonable in relation to anticipated benefits, if any, to subjects and the importance of the knowledge that may reasonably be expected to result. In evaluating risks and benefits, the IRB should consider only those risks and benefits that may result from the research (as distinguished from risks and benefits of therapies subjects would receive even if not participating in the research).

(3) Selection of subjects is equitable.

(4) Informed consent will be sought from the subjects or their authorized representatives.

(5) Informed consent will be appropriately documented.

(6) Where appropriate, the research plan makes adequate provision for monitoring the data collected to insure the safety of the subjects,

(7) Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of data.

The IRB must assure that adequate provisions are made to protect the rights and welfare of subjects who are vulnerable to coercion or undue influence or who are ill or economically or educationally disadvantaged.

IV. State Statutes on Human Subjects Research

During the 1970's when political concern about human subjects research was at its highest point, several states enacted statutes to protect human subjects of biomedical research.[28] While many states have statutes entirely forbidding or sharply restricting research on abortuses, fetuses or fetal tissue, few make mention of the rights of a child or adolescent who is a research subject. Moreover, almost all state statutes provide that research subject to federal regulation is exempt from state requirements, so the number of biomedical research projects actually subject to state regulation is probably very small.

The New York statute[29], for example, provides that all human subjects medical research conducted in that state must include the voluntary informed consent of the subject subscribed to in writing. If the subject is a minor, the statute provides that the parent or must sign. This statute applies exclusively to medical research and hence would not be involved in a study involving educational research, questionnaires or other non-medical investigations. The California statute provides that all studies involving investigational drugs must include consent from the parent or guardian of a minor and of the minor if he or she is more than 7. California's statute also requires review of any such activity by a human subjects protection committee.[30] Virginia's requires consent of a minor's representative and of the minor if he or she is able to give informed consent.[31]

State statutes protecting the rights as human subjects of institutionalized or mentally handicapped persons normally do not differentiate between adults and minors in these categories. Most provide that human subjects research may not be done in this population without guardian permission.[32]

V. Federal Regulation of Research and Innovation with Minors

[a] Background

Issues about consent to research on children and adolescents provoked controversy for many years. Some authorities, both legal and ethical, had taken the position that a parent cannot give a valid consent for any medical procedure on a minor not for the direct benefit of the minor.[33] Some objected to research that entailed more than minimal harm, citing the Supreme Court's opinion in Prince v. Massachusetts[34] "Parents may be free to become martyrs themselves but it does not follow that they are free in identical circumstances to make martyrs of their children before they have reached the age of full and legal discretion when they can make the choices for themselves." Others, such as ethicist Paul Ramsey took the position that even in the absence of risk, an unconsented touching is a moral wrong.[35] This view would preclude harmless research on children as well as anything that had any potential for harm.[36]

The contrary view, that parents may consent to research if the minor is exposed to no discernible risk was presented as early as 1969 in an article in the Journal of the American Medical Association[37] and was the position taken by both the American Academy of Pediatrics and the American Medical Association.[38]

The Report of the National Commission endorsed the concept of research on children. Its Recommendations[39] for protecting their rights in the course of investigations became DHHS Regulations in 1983.[40] The Regulations took significant steps forward expanding the role of necessary medical and behavioral research on children while protecting them carefully. They resolve, at least in part, the conflict between those who fear harm will come to children and adolescents involved with research and those who seek its benefits.[41]

Unfortunately, however, neither the Commission's Recommendations nor the Department of Health and Human Services Regulations that followed them differentiate among age groups of minors, thus the same regulations are applied to two year olds and sixteen year olds.

[b] Federal Regulations on Research Involving Minors

The Regulations provide that research on children, defined as persons less than 18 years of age, will be funded by the Department of Health and Human Services (DHHS) if the Institutional Review Board finds that minimal risk exists and that adequate provisions have been made for obtaining permission from parents and assent of children. A study involving more than minimal risk is acceptable if there is a prospect of direct benefit to the child and the risk found by the IRB is justified by the anticipated benefit and the benefit is at least as favorable as alternative available therapies.[42]

The Regulations do not provide a definition of "minimal risk" but other regulations define "minimal risk" as " the risks of harm anticipated in the proposed research are not greater, considering probability and magnitude, than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests."[43] Thus pricking a child's finger for a drop of blood would be "minimal risk" since it is routinely performed at physical examinations, drawing a large amount of blood would not. It is assumed, apparently, that the members of the IRB will use their common-sense experience and their clinical experience to determine "minimal risks."

A "material risk" of harm with a minor subject should certainly include any procedure that, although not physically harmful, may frighten or upset the young person. Psychological tests that involve misleading or deceiving a child or adolescent might well be held to constitute "serious risk" in some children and ethically deplorable for all. Some discussions of sensitive topics or asking questions about them (i.e., sexual activity, drug abuse, abuse at home, and the like) may create serious risk of emotional pain. Any genuine pain, as opposed to momentarily minor discomfort, to these subjects is clearly "harm."

The Department of Health and Human Services will conduct or fund research in which the IRB finds that more than minimal risk is presented to a child by an intervention that will not benefit him or her only if the IRB finds that the risk is a minimal one, the subject's experience with the intervention is reasonably commensurate with those inherent in situations the subject has already encountered, the generalizable knowledge to be obtained is of vital importance in understanding or ameliorating a condition from which the subject suffers and the subject assents and his or her parents give permission.[44] Research that does not meet those requirements can only be funded if the IRB believes that it will present an opportunity to further the understanding or treatment of a serious condition affecting the welfare or health of children and the Secretary of DHHS appoints a panel of experts who concur that the research is both ethical and scientifically important and provision is made for permission of parents and assent of the subjects.[45] Since the authorization for funding of the panel of experts known as the Ethics Advisory Board expired in 1980, no mechanism exists today for approval of federal funding for studies involving more than minimal risk.[46]

[c] Unfortunate Consequences of Restrictions on Research

Doubts about consent for minor subjects in research have had several regrettable consequences. First, because of the view that children and adolescents should be "protected" from the "dangers" of being research subjects, there were until recently few, if any, trials of drugs on sick children. A great many drugs, some of which may be helpful in the treatment of children, are labeled "Not for pediatric use" or "This drug has not been tested and approved for use on children and infants." Pediatricians treating sick children or younger adolescents in the course of ordinary clinical practice are thus in effect experimenting when they prescribe most drugs.[47]

Drugs tested in adults may have different effects when given to children or younger adolescents, who are physiologically different from, and not just smaller than, adults. Since no results are available to establish boundary levels in children, the maximum dosages may be uncertain. Since children do require medication, tragedies can occur in situations in which a medication affects children differently from adults. For example, infants treated with choramphenicol may develop "gray sickness" but adults do not.

When the package label says "not approved for use in children" two questions arise for the physician who concludes that the child needs the medication. First, does the physician have an obligation to disclose the labeling disclaimer to the parent? The answer appears to be yes, to the extent the information is material to the decisions facing parents.

Second, is the physician at legal risk for prescribing medication not approved for pediatric use because such use might be deemed "negligent," notwithstanding parental consent? Cases on the precise point are nonexistent, but in many drug cases, courts have held that the package label is admissible in evidence as prima facie proof of the standard of care. The plaintiff bears the burden of proof that the physician deviated from the package label instructions.[48] Once that burden is established, however, the physician may prove that use of the drug was good medical practice.[49] It is by no means negligent to deviate from package inserts in prescribing drugs. If such an action were brought against a physician, the first question would be whether the child's condition required medication at all, the second whether use of the drug in question was standard practice in pediatrics and the third whether a drug approved for children was available that would have been equally effective.

The second unfortunate consequence of excluding children from research is that they may actually be exposed to greater harm outside the setting of a clinical trial than in one. In the uncontrolled setting, reports of side-effects are usually sporadic, and physicians caring for the children may even fail to recognize such effects. Delays can impede the reporting of the adverse occurrence in medical journals, to the manufacturer and to the FDA. Meanwhile, children all over the country may be having the same unrecognized problem. During a drug trial, by contrast, a limited number of children receive the drug and are closely monitored, which permits adverse effects to be noted at once.[50]

VI. Consent and research with adolescents

The capacity to give an informed consent to research is the chief area of controversy in the discussions of the rights of adolescents to participate in research without parental involvement.

The DHHS Regulations provide that in most cases parents of minors will be involved.[51] Their permission must be obtained and, if old enough, mature enough and of an appropriate psychological state, assent of the child must be obtained. This provision would quite clearly include even the youngest adolescent. Thus unless a minor were to be denied health care to which he would not otherwise have access unless he participates in a research project (for example, in a situation where the only available treatment for the child's medical problem is an investigational drug) the child or adolescent has the right to refuse to participate.

The Commission's Recommendations and the Regulations abandoned the term "consent" to research except in those situations in which an autonomous adult may make decisions on his or her own behalf, and in the discussions of research on children, used the term parental or guardian "permission." Further, the Commission concluded that the assent of the child, if he or she is old enough to give it, should be obtained, and he or she should be given a form analogous to the consent form used for adult subjects.[52]

In using the terms "permission" and "assent" the Commission clarified legal nuances which are often misused, particularly by lawyers. "Consent" is an active, comprehending agreement to something, always on one's own behalf and never on behalf of another. "Assent," on the other hand, has two quite separate meanings. When a person who is legally capable of giving a consent gives an assent instead, the word means "passive acquiescence" -- a "going along with." Relevant to the Commission's Recommendations, a person who is not legally capable of giving "consent" may in fact give a fully informed, active agreement. This agreement by a person who is perhaps only technically incapable of giving a legally valid consent is the second meaning of the term "assent."[53] For example, a twenty-five year old competent person gives consent to a medical researcher to withdraw a blood sample. An intelligent twelve year old may understand just as clearly why the researcher wishes to withdraw the blood, realize just as completely that it will produce momentary discomfort and may wish, just as actively, to agree. Because the legal system holds that children as a class and without regard to individual capacity to understand are ruled incapable of consent, the twelve year old's agreement is termed "assent."

As is well documented by Gittler, et als, courts, during the past several decades, have substantially broadened the right of an adolescent patient to consent to medical treatment without parental knowledge.[54] In that context, one issue that has engendered debate among lawyers and ethicists since the Commission's Report on Children is whether an adolescent who is competent as a mature minor to consent to medical treatment without parental involvement may also consent to minimal-risk research without permission of his or her parents.[55]

Under current federal regulations, parental permission may be dispensed with if the IRB determines that the research project is designed for a subject population for which parental permission is not a reasonable requirement.[56] While examples of this given in the regulation are neglected and abused children, this provision is the one under which may commentators believe adolescents may consent to some research without their parents' knowledge.

Section 46.408 (c) of the Regulations does permit this. This regulation, based on the Commission's Recommendation, dispenses with the necessity of parental permission for participation in research equivalent to most treatment interventions for which the adolescent may consent as long as the IRB agrees that requiring permission would be "unreasonable." No IRB is likely to waive parental permission in any research involving more than minimal risk of physical harm.

Psychosocial problems of adolescents are probably compounded by their unwillingness to let their parents know about their difficulties; study of these problems is impossible as long as there is a requirement for parental involvement. The troubled adolescent will not participate if his family will find out about his problems. No one, for example, knows about the incidence of positive HIV antibodies in adolescent drug abusers or homosexuals. No one knows why teenage girls choose not to obtain and use contraception when it is available to them. The list of topics adolescents find "sensitive" may, in fact, be much longer than that imagined by adults.

Adolescents are usually involved in research in one of four situations.

1. Adolescence is relevant to the condition studied. An example would be a survey of attitudes of teenagers who have had abortions or surveys about their use of contraceptives.[57] In this context, not only would it be an imposition on a teenager whose parents did not know that she had an abortion or was taking birth control pills or was, in fact, sexually active to get their permission to answer questions about it, she would undoubtedly decline to participate. It certainly seems appropriate to dispense with parental permission in these cases.

2. Adolescence is irrelevant to the research. For example, a medical researcher posts notices in undergraduate dormitories that he would like research subjects to give a tube of blood and offers to pay $5.00. One of the volunteers is a sixteen year old freshman. Most IRBs would waive parental permission only where there is little or no risk involved.

3. The research involves an attempt to recruit subjects from a variety of age groups. For example, a political scientist wishes to survey a variety of people in the community to find out how many of them recognize the Bill of Rights. One group he wants to include is a group of sixteen year old "candy stripers" at the local hospital. If the information is not particularly sensitive,

there seems no reason to require parental permission.

4. Research is not related to the patient's age but an adolescent patient has a disease which a clinical researcher wishes to study or an investigational drug is proposed for treatment. For example, a sixteen year old has leukemia which is not responsive to standard therapy and the hematologist taking care of the patient wishes to enroll him in a protocol for an investigational drug. Since investigational therapy with a risk of serious side effects is reserved for conditions that are themselves serious, regardless of the patient's age, it is not very likely that a teenager with leukemia is being treated without parental knowledge. Thus protocols of this sort are most unlikely to present the issue of the waiver of parental permission. If they do, however, permission should almost always be obtained. There may be emancipated or independent minors being treated for serious diseases without parental involvement, but waiver of parental permission should only be considered in these very rare cases.

It would seem, in short, that research participation should follow the same track as treatment participation -- that if an adolescent may consent to treatment of a medical problem by him or herself, then he or she should, for the most part, be able to consent to minimal risk research about the same problem. This would essentially exclude involvement of an adolescent in drug testing without parental knowledge, since almost no trial of a drug which will be restricted to use by prescription would be considered "no more than minimal risk." Of note, drug companies in particular, probably for reasons involving fear of liability, and most academic pediatricians and specialists in adolescent medicine, are not, apparently, seeking to expand their investigations into treatment of adolescents under circumstances where parental consent is not required.

VII. The Adolescent and Consent to Social or Educational Research

When the National Commission's proposals for research on children were published, educational organizations objected to parental consent requirements for research in the schools on the grounds that to implement them would require unnecessary effort and expense.[58] This view prevailed at the Department of Health and Human Services, thus educational research is not only exempted from any requirement of review by an institutional review board, it is also exempted from parental permission requirements and apparently from regulatory acknowledgement of the minor's right to refuse to participate.[59]

While DHHS may have exempted educational research from requirements of either consent or review on the grounds that it is "innocuous", there exists at least a potential that this sort of research may be far more damaging to a child than is a minimal-risk activity conducted in the context of biomedical research.[60]

The desired end of the educational enterprise is the production of young people who are able to function as autonomous adults. One important purpose of schools is to teach children and adolescents to make intelligent choices decisions. That being the case, it seems extraordinary that research on educational innovation (such as changes in curriculum) or psychosocial research in schools does not require permission of or even notification to parents, much less agreement of the students.[61]

While in most cases, requiring IRB review and/or parental permission for research in the classroom might appear to be superfluous, some psychological research which asks children personal questions about themselves or their families could violate customary standards of privacy. The federal regulations' exemptions for this category of research includes only those test instruments where identifiers are not used, but other information from these tests (such as birth date, number of siblings, town of birth) is probably sufficient to permit the teacher to determine which answer sheet goes with each child on an "anonymous" questionnaire. [62]

The results of such research may harm young people directly as well as violating family privacy. Unproven test instruments which may provide inaccurate results but which may be entered later into permanent school records have the potential for even greater harm to children who are the subjects of this research than most biomedical research that receives strict scrutiny from IRBs. Classification of children as "gifted," "slow," "hyperkinetic" "depressed" or "uncoordinated" if entered into school records will follow the children to their detriment throughout their educational careers.[63]

Moreover, "psychological" research in schools, even if supposedly not linked to the identity of the subjects, might well result in discovery of abuse, drug or alcohol problems or serious emotional difficulties. What obligations, if any, would a researcher assume in trying to identify a young person at risk of serious harm based on answers given on a research instrument? Moreover, since the project was not explained to parents in advance, how would the credibility of the school and/or the research enterprise itself be affected by, for example, a newspaper story indicating that a teacher investigated possible abuse by questioning a child or adolescent because of answers given on an "anonymous" research instrument and then, satisfied that a problem existed, notified authorities?

Students in public schools retain their fundamental rights, including their right to privacy and belief systems.[64] The only decision[65] on development of psychological tests in schools, involved a situation in which an untested and unproven "psychological test" being developed by a school system was to be used to put students in classes for "deviants" who might become drug abusers even though there was no evidence that any of the children had ever used (or even seen) an illicit drug. The child-plaintiff, whose mother objected to such questions as whether he was hugged at home on grounds that they were none of the school's business, was labeled a "deviant" and assigned to "Deviant Class" because his mother objected to the test.

While the federal regulations certainly seem to protect the interests of children in biomedical research, the assumption that whatever goes on in the classroom cannot be harmful is probably inaccurate.[66] Recognition of the harm that incompetent testing may do to a child is the basis of the requirement in the Education for All Handicapped Children Act for parental involvement in plans to give placement tests to children who are being evaluated for special education classes.[67] It has also been the subject of many suits when, years after placement in special education or in a "tracked" system, it was discovered that the child in question was not retarded or otherwise handicapped, but that by the time the discovery was made, there was no possibility that the child could ever catch up to grade level skills.[68] law When the test instrument itself may be unreliable, the risk is even greater.

In many cases, also, parents might object to educational research with either younger children or with adolescents because they disagree with its purpose. The possibility of a disagreement on the purpose of the study, even though the student would obtain a direct benefit, might well arise in some form of psychological, social, or behavioral research. For example, research on adolescents who have reading disabilities could conceivably benefit the particular subjects, but the data could later be used to "prove" that the social or ethnic group of which the child is a member is inferior to other groups in reading aptitude, not achievement. Press reports, for example, indicated that research comparing aptitude levels in mathematics of boys and girls "proved" that boys were clearly superior, and numerous objections from women's groups followed.[69] Thus, particularly in any comparative study based on hypotheses that some group may be superior or inferior to another in some respect, the overall purpose of the study must be explained to the parent and to the adolescent when permission is requested. That aspect of the investigation might well be of equal or greater interest to them than the immediate benefit which they hope will accrue to their child. It is possible that minority or low socioeconomic status young people may be especially at risk in this regard.

If a new approach to, for example, teaching reading in the primary grades is unsuccessful, the children will be seriously handicapped as they progress through higher grades with deficits in reading skills. We argue that in this area, federal regulations should be tightened. Parents of younger children should be informed that a new method of reading instruction is being planned, the method should be explained, and parents should have the option of placing their children in a classroom where conventional methods (whatever their defects) are being applied. Adolescents in this situation should have choices of their own, although in most cases it might be appropriate to obtain permission from parents as well.

In the area of psychosocial research (a new approach to finding out which children are likely to grow up at risk of drug use, for example) since "anonymity " is a myth within a small group, parents of young children and adolescents on their own behalf ought to have the right to know what is being planned and to declare that they do not wish to participate. Adolescents should have the right to refuse to participate without parental involvement. Litigation on the introduction of AIDS education (including specific sex education) has usually resulted in findings that parents do not have the right to remove their children from exposure to this information, but inquiries about the child's family life to develop such a curriculum would have been a different matter.[70] For years courts have held that parents must have the right to have their children excused from sex education classes.[71] If parents have the right to object to substance, there appears to be no reason why they cannot object to the form in which information is presented to their children if there is a demonstrated possibility that the new method of instruction could result in lower levels of achievement for the children.

If children are considered to be competent witnesses in trials, as they are, and if the National Commission recommended that their right to dissent from participation in biomedical research be recognized at the age of seven, there would appear to be ample legal evidence that they are in fact capable of understanding information, assessing what they understand, and responding to it adequately in the classroom as well. As is explained in detail in the companion paper by Gittler, et als, comprehension by young adolescents is much more complex than most legal authorities have ever imagined, and in this area of research, in particular, age distinctions begin to blur.

In London, any research done in schools run by the Inner London Educational Authority must be approved by a research committee, although control of educational research in other parts of the country is variable.[72]

Based on common understandings of the meaning of the federal regulations involving research on children, the position that we believe should be taken is that the same safeguards required for biomedical research should be required of all research, including psychological, social, behavioral and educational research, involving minors, not merely that currently subject to those regulations.

We would suggest that school districts in which educational or curriculum research or innovative psychosocial or educational testing is to be introduced should be required to have IRBs composed of a majority of parents. Parents should represent the community of students in terms of ethnicity and sociology. Other members of the IRB should be classroom teachers, some administrators and high school students. Each research project should be approved by the IRB and specific provisions for notice to parents and students should be determined by that group. Any project involving testing of children in a way which is calculated to reveal personal information about the student or his or her family should require explicit consent by parents and a child of junior high or high school level should be given the right to refuse to participate even if parents consent. Development of academic achievement tests (i.e., new ways to assess reading ability) which do not compare one group -- ethnic, socioeconomic or gender -- with another could be exempted from consent requirements.

[a] Young adolescents (ages 10-14)

As the Gittler, Quigley-Rick and Saks paper indicates, children in this age group are quite capable of understanding and assessing proposed educational research.[73] Moreover, asking them if they wish to participate in some academic activity designed to elicit knowledge might very well make them more willing to cooperate than they are when such testing is imposed upon them.

[b] Mature minors (ages 14-18)

Young people in this age group, many of whom may be living on their own, some of whom may have children of their own, should be afforded the same respect in the educational arena as a young adult in college would expect. It would seem that in most cases they should be able to consent to participation in educational or social science research without parental involvement and if the research involves inquiry into drug or alcohol use or sexual behavior, even if identifiers are not used, parents should not be notified.[74]

[c] The Minor in Detention

Medically-related educational or social science research with minors confined to reformatories may have constitutional as well as ethical implications. For example, behavior modification techniques and aversive therapy introduced on an investigational basis in reformatories were held to be a violation of the young prisoners' rights against cruel and unusual punishment.[75] Another issue peculiar to this group is the question of confidentiality. Any questionnaire research on, for example drug use, illegal sexual behaviors or violations of the reformatory's rules may violate the inmate's rights against self-incrimination.[76] Even if the researcher is a physician, since the purpose of the interaction is not therapy but research, physician-patient privilege would not apply and the researcher must advise the young person that confidentiality is inapplicable. Confidentiality Certificates, under which information gathered in the course of research sponsored by the Law Enforcement

Assistance Administration may not be subpoenaed or used against the prisoner, may be obtained from LEAA.[77]

Regulations pertaining to research on prisoners were promulgated by DHHS and the Food and Drug Administration after the National Commission considered the matter and published its report. The Commission had serious reservations about the capacity of any incarcerated person to give an uncoerced, informed consent and presumably that issue would be raised even more strongly with juvenile offenders. The Commission's Recommendations[78] which became regulation[79] do permit studies of the possible causes, effects and processes of incarceration. Studies of prisons as institutional structures may be supported by the federal government provided that the studies present minimal or no risk to the prisoners. Research is also permitted on practices which have the intent and reasonable probability of improving the health or well-being of the individual prisoner. An Institutional Review Board including prisoners or prisoners' advocates and community representatives, including physicians and clergy not associated with the institution must approve the research.

While parental consent in some cases might appear to be indicated, since many of the young people in detention have no viable family unit from which to seek consent, insistence on parental involvement may mean that no research can be undertaken on this population.[80] Many of these children are runaways, "throwaways" or were living on the streets because they had nowhere else to go and in many cases if there were a home to which to return, they would not be in detention.

[d] Wards of the State

Current federal regulations applying to research on children provide that minors (of any age) who are wards of the state (including those in detention, foster care and similar circumstances) may participate in research only if it is related to their status as wards (i.e., a study of the effects of detention on juvenile offenders) or if the research is conducted in settings such as hospitals or schools where the majority of the children involved are not wards.[81] The IRB approving the research must require appointment of an advocate for the wards involved as subjects in the research.

Unfortunately, however, even with IRB approval, some states' Departments of Child Services (the guardian agencies of children in detention or foster care) refuse to permit children in their care to participate in research which will confer clear benefit upon them. For example, at the Yale University School of Medicine-Yale-New Haven Hospital Pediatric AIDS clinic, one-third of the patients are in foster care. The State Department of Children and Youth Services' New Haven Chief (the authorized agent for consent) refuses to let these children receive AZT or Pentamidine, both clearly indicated in their treatment, because both are on investigational drug status when used with children. These children will die sooner than they would if they received these medications because this state agency is seeking to "protect" them.[82]

VIII. The Adolescent's Consent to Biomedical Research

The extent, as a practical matter, to which minors may participate without parental involvement in biomedical research is largely determined by the context of the research. As Gittler, et. als. have pointed out in their companion paper, the increasing autonomy of adolescents in many phases of American culture is reflected in a recognition of a minor's right to consent to medical treatment. Consent rights in the context of medical care, however, may be more dependent on financial or other factors than they are on recognition or appreciation of the minor's autonomy.[83] Regardless of the legal right an adolescent may have to consent to treatment, insurance is usually held by parents or guardians, with a minor covered by parents' policies. It is therefore most improbable that an adolescent could be admitted to a hospital for a non-emergency procedure or to the hospital's Clinical Research Center without his or her parent's knowledge, since the admitting office would require parental involvement for insurance purposes. As a practical matter, then, it is almost impossible to provide inpatient care without parental knowledge for an adolescent living at home.

For that reason, realistic consideration of the adolescent's right to make decisions about participation in research without parental involvement is confined, almost exclusively, to outpatient treatment and research that would be performed in that setting.

Since the Commission specified that an IRB has the authority to determine that parental consent is not an appropriate requirement in a given protocol and since, by definition, research on minors must present "no more than a minor increment above minimal risk" from the research aspect of the intervention, the possibility of actual physical harm arising from any intervention likely to be proposed by a biomedical researcher who wishes to dispense with parental consent is vanishingly small. Furthermore, for example, it is difficult to imagine an investigational drug trial (to which all federal requirements would apply, since the purpose of the trial is almost always to accumulate data for submission to the Food and Drug Administration) in which a manufacturer would permit a researcher to enroll anyone under 18 without parental permission, since the manufacturer would be wary of product liability actions. If RU-486 is ever the subject of clinical trials in this country, however secure the adolescent's right to obtain an abortion without parental consent may be at the time, the possibility that the manufacturer would want to include adolescents in those trials is vanishingly small. AZT is certainly not being distributed to adolescents as part of clinical trials without parental consent.[84]

Physicians customarily base their decisions about treatment of minors without parental consent not only on the child or adolescent's age and level of maturity but on the nature of the illness. For example, a fifteen year old who lives with his parents and who appears at an adolescent clinic with an uncomplicated sore throat or acne is likely to receive treatment without any particular thought of notifying his parents. The same adolescent is not likely to be treated for a serious illness such as leukemia, even on an out-patient basis, without involving parents. Not only does the therapy have risks of harm, but the adolescent's oncologist would wish to involve the family in the situation so that they can provide help, care and emotional support for him. Thus the age of the young person is not the only factor in decisions about consent to adolescents' health care.

The same rule of thumb appears sensible to apply to research. It is not likely that any drug manufacturer or pharmacologist involved in drug development will ever ask to do Phase I drug studies, determinations of toxicity levels, on minors, with or without parental consent.[85] Use of investigational drugs (at all) with sick children and adolescents probably should be -- and likely is -- reserved for situations of consequential illness when nothing available to the physician is likely to be as effective as the investigational drug. That being the case, parents presumably would be involved in the therapeutic decisions about care of the patient long before the question of involvement with a Phase II or Phase III study would ever arise.

Use of placebos in a randomized clinical trial including minor patients is probably unwise. If the young person is sufficiently ill to require an investigational drug, the alternative arm of the study should be the most effective therapy available outside the trial or, better, an open-label drug trial should be planned.[86]

Drug trials aside, even minimal risk but invasive research involving an young person sufficiently ill to have involved his or her family in the therapy probably should involve them in the research. For example, any young person requiring a spinal tap for therapeutic reasons is probably sufficiently sick to require parental agreement to perform one for research purposes, although the risk of harm is apparently miniscule.

In some cases, the only treatment for a minor's medical problem is within a study of an investigational drug. For example, all available drugs for the treatment of children with AIDS are on investigational status for children, even if the New Drug Application has been granted for use of the drug in adults. In this situation, the right of the minor to refuse to participate in the project is no doubt coextensive with the minor's right to refuse standard treatment to which his parent consents. Except in that context, however, although the final Department of Health and Human Services Regulations did not establish an age at which a minor's "deliberate objection" would be controlling (The National Commission recommended age seven) the right to refuse to participate in research, when an adolescent is asked to participate, is greater than the right of a minor to refuse treatment.[87]

IX. Restrictions on parental permission

If a satisfactory treatment for a minor's problem exists (especially if the problem is not life-threatening) it is unlikely that a parent, much less an adolescent alone, would have the right to consent to a more-dangerous innovative or experimental treatment. In fact, one could argue that such permission would constitute child abuse. While there are no cases on the point, the following example would suffice: Standard therapy for Disease X, which is uniformly non-fatal, causes hair loss. Standard therapy, however, cures Disease X. The mother of a 15 year old girl suffering from X is so distressed at the thought of her daughter's losing her hair that she agrees to enter the girl in the trial of a drug that has, as a known side effect, bone marrow depression, which, of course, can cause death. There is no reason to believe that the mother has the authority to give permission for such a drug trial. Since IRBs tend to be extremely conservative about research involving minors, however, and by definition any drug trial must be approved by an IRB, this situation is most unlikely ever to arise.

X. Court-ordered participation in research:

Although there have never been any cases on this point, the following situation might arise at any time: An adolescent has a disease such as leukemia. His parents and the patient both wish to refuse chemotherapy and go to a laetrile clinic. The physicians treating him obtain a court order for chemotherapy.[88] The chemotherapy fails. The oncologist caring for the adolescent wishes to try a drug on investigational status as a treatment of last resort. The patient and his parents refuse. If the physician attempts to get another court order for the investigational drug, as long as it is in that status, the court would have no authority to order participation in the drug trial. Part of the elements of the federal government's requirements for consent to participation in research is the right to refuse to participate or to withdraw at any time after the research has begun.[89]

XI. The Impaired Minor

The crux of the concept that adolescents may consent to participate in research on their own is based on the legal and ethical position that the prospective subject, although a minor, is as capable of giving informed consent as an adult who is also asked to participate in the same study. When that is not the case, the theoretical basis for argument in favor of adolescent autonomy no longer exists. A retarded adult is also not deemed capable of giving informed consent to research or to therapy, hence others, usually family members, must consent on his or her behalf to any medical intervention.

The National Commission issued Recommendations for Research Involving Those Institutionalized as Mentally Infirm. The Recommendations included patients in institutions for the retarded, those who are institutionalized because they have other sorts of cognitive deficits (patients with Alzheimer's, for example) and some but not all patients in psychiatric hospitals. Under the Recommendations, the IRB must first establish that the competence of the investigator and the quality of the facility are sufficient for the conduct of the research. The investigator must then convince the IRB that there are good reasons to involve this population in the research project -- that the study bears some relation to the problem from which the subjects suffer. If the study is relevant to such a problem, but subjects outside of the institutional setting are equally available and the project does not examine the effects of institutionalization, the project cannot be justified. Next, the person's health care provider must be satisfied that the research will not jeopardize the interests of the patient and the IRB must determine that no more than minimal risk is presented and the subject agrees to participate. If the subject is so impaired that agreement is not possible, a guardian (if any) or family member must consent.

Unfortunately, DHHS has never promulgated regulations for this population of patients. The President's Commission insisted in 1981 and 1983 that the regulations were necessary[90] but the

Secretary insisted that they were not, and that the basic regulations on human subjects research adequately protects this population. Whether that is correct with adult patients, it is certainly not possible to justify any research, no matter how innocuous, on an impaired minor without parental or guardian involvement. The bare legal rule is that minors are incapable of consent. As the Gittler paper and this paper, along with numbers of other books and articles[91] demonstrate, incapacity to consent is certainly not the case in most instances, involving "older adolescents" and others who are considered mature minors, but the burden of justification of minors' consent rests on the person who is arguing that it is sufficient. This argument cannot be made with an impaired minor.

XII. The educationally deprived minor

A young person whose educational level for socioeconomic reasons is less than age appropriate may still be perfectly competent to make autonomous decisions.[92] Overly paternalistic approaches to these young people may, in fact, be harmful. Adult illiteracy in this country is a substantial problem, but no one argues that illiterate adults have fewer rights than others to make decisions for themselves -- lack of education should never be confused with lack of ability. There may be many reasons why either an adolescent or an adult cannot read a consent form -- he or she may be illiterate, or exquisitely educated in a language other than English but unable to read either English or a consent form that requires the reading skills of a graduate student. The consent negotiation prior to presenting the consent form as a summary should be an oral presentation adequate to explain the research and to allow the prospective subject to choose to participate or to refuse. Thus the educationally deprived adult or adolescent should not be treated as less than autonomous.

XIII. Confidentiality

If an investigator is not prepared to keep a promise of confidentiality to a research subject, that promise should not be made. Once an adolescent has been accepted into a research project with that promise, in the absence of extraordinarily compelling reasons (such as the discovery in the course of the research that the subject is suicidal or has been abused under circumstances where there is a legal mandate to report it) that confidentiality should be maintained. The Institutional Review Board should consider, when reviewing any protocol involving adolescent consent, what information might be evoked in the course of the research which could present the investigator with this dilemma and insist that careful plans be made in advance of commencing the study for determining what information might be revealed. For example, if a psychiatrist wished to administer questionnaires about eating habits to the population of a girls' boarding school (an age group in which serious eating disorders might be discovered) the consent form should say something such as "Although we intend to keep your answers confidential, if they indicate a serious problem (such as anorexia or bulemia), we would like to interview you. If, after we interview you, we think that you have a serious problem, we must inform your parents or the Principal of this school." If the investigator claims that in that case, no one with an eating disorder will answer the questionnaire and what is being studied is the prevalence of the problem, the IRB should insist that the study be done on young adults. Part of the ethical responsibility of those health care providers who deal with young people is to recognize and refuse to walk away from serious disorders discovered in the course of either the therapeutic relationship or in research. If a teenage mother tells a researcher that she is abusing her child, that information by law cannot be kept confidential and the young mother invited to participate in the study should be told that before she agrees to become a subject. Confidentiality with minors may have limits when confidentiality with adults might be respected under the same circumstances,[93] but the "ground rules" must be made explicit in advance.

XIV Summary

We believe that current regulations for biomedical research on children as recommended by the National Commission in 1977 and enacted into regulations of the Department of Health and Human Services in 1983 are adequate to protect the interests of the adolescent research subject. In particular, under these Regulations, each project in which parental consent will not be required must be individually approved by the IRB. Our concern is that these regulations do not extend to non-biomedical research, such as educational research and health-related research (such as surveys of sexual behaviors, eating disorders and the like) in schools and that adolescents are not protected in that setting. We would strongly urge the Carnegie Foundation and the Office of Technology Assessment to advise the Congress that, at minimum, the same research protections that would apply if a researcher wanted to stick an adolescents' finger to obtain a few drops of blood be extended to surveys of sensitive topics in the classroom setting as long as that school receives any federal funding.

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(19) See Curran, *supra* at 17.

(20) Levine, *supra* at 1, page 324.

(21) 45 *CFR* 46.

(22) The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, *Institutional Review Boards: Report and Recommendations*, DHEW Publication No (OS) 78-0008, Appendix, DHEW Publication No (OS) 78-0009, Washington, 1978.

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(42) 45 *CFR*, Part 46, Section 404

HHS will conduct or fund research in which the IRB finds that no greater than minimal risk to children is presented, only if the IRB finds that adequate provisions are made for soliciting the assent of the children and the permission of their parents or guardians as set forth in 46.408.

45 *CFR*, Part 46, Section 405

HHS will conduct or fund research in which the IRB finds that more than minimal risk to children is presented by an intervention or procedure that holds out the prospect of direct benefit for the individual subject, or by a monitoring procedure that is likely to contribute to the subject's well-being, only if the IRB finds that:

(a) The risk is justified by the anticipated benefit to the subjects;

(b) The relation of the anticipated benefit to the risk is at least as favorable to the subjects as that presented by available alternative approaches;

(c) Adequate provisions are made for soliciting the assent of the children and permission of their parents or guardians as set forth in 46.408.

(43) 45 CFR Section 46.102 (g).

(44) 45 CFR, Part 46, Section 406

HHS will conduct or fund research in which the IRB finds that more than minimal risk to children is presented by an intervention or procedure that does not hold out the prospect of direct benefit for the individual subject, or by a monitoring procedure which is not likely to contribute to the well-being of the subject, only if the IRB finds that:

(a) The risk represents a minor increase over minimal risk;

(b) The intervention or procedure presents experiences to subjects that are reasonably commensurate with those inherent in their actual or expected medical, dental, psychological, social or educational situations;

(c) The intervention or procedure is likely to yield generalizable knowledge about the subjects' disorder or condition which is of vital importance for the understanding or amelioration of the subjects' disorder or condition; and

(d) Adequate provisions are made for soliciting assent of the children and permission of their parents or guardians, set forth in 46.408.

(45) 45 CFR, Part 46, Section 407

HHS will conduct or fund research that the IRB does not believe meets the requirements of 46.404, 46.405, or 46.406 only if:

(a) The IRB finds that the research presents a reasonable opportunity to further the understanding, prevention or alleviation of a serious problem affecting the health or welfare of children; and

(b) The Secretary, after consultation with a panel of experts in pertinent disciplines (for example: science, medicine, education, ethics, law) and following opportunity for public review and comment, has determined either: (1)That the research in fact satisfies the condition of 46.404, 46.405, or 46.606 as applicable, or (2) the following: (i) The research presents a reasonable opportunity to further the understanding, prevention or alleviation of a serious problem affecting the health or welfare of children; (ii) The research will be conducted in accordance with sound ethical principles; (iii) Adequate provisions are made for soliciting the assent of children and the permission of their parents or guardians, as set forth in 46.408.

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(48) Carter v. Metropolitan Dade County, 253 So 2d 920, Fla 1971; Hirsch, Harold L., The Medicolegal Implications of the Package Insert, *Case and Comment*, January 1977, page 14; Lhotka v. Larson, 238 NW 2d 870, Minn 1976; Koury v. Follo, 158 SE 2d 548, NC 1968; Pfizer, Inc. v. Jones, 272 SE 2d 43, Va 1980.

(49) E.g., Mueller v. Mueller, 221 NW 2d 39, SD 1974; Dalke v. Upjohn Co., 555 F 2d 245, CCA 9, 1977.

(50) Holder, Angela R., Constraints on Experimentation: Protecting Children to Death, 6 *Yale Law and Policy Review* 137, 1988.

(51) 45 *CFR*, Part 46, Section 408

(a) In addition to the determinations required under other applicable sections of this subpart, the IRB shall determine that adequate provisions are made for soliciting the assent of the children, when in the judgment of the IRB the children are capable of providing assent. In determining whether children are capable of assenting, the IRB shall take into account the ages, maturity, and psychological state of the children involved. This judgment may be made for all children to be involved in research under a particular protocol, or for each child, as the IRB deems appropriate. If the IRB determines that the capability of some or all of the children is so limited that they cannot reasonably be consulted or that the intervention or procedure involved in the research holds out a prospect of direct benefit that is important to the health or well-being of the children and is available only in the context of the research, the assent of the children is not a necessary condition for proceeding with the research. Even where the IRB determines that the subjects are capable of assenting, the IRB may still waive the assent requirements under circumstances in which consent may be waived in accord with 46.116 of Subpart A.

(b) In addition to the determinations required under other applicable sections of this subpart, the IRB shall determine, in accordance with and to the extent that consent is required by 46.115 of Subpart A, that adequate provisions are made for soliciting the permission of each child's parents or guardian. Where parental permission is to be obtained, the IRB may find that permission of one parent is sufficient for research to be conducted under 46.404 or 46.405. Where research is covered by 46.406 and 46.407 and permission is to be obtained from parents, both parents must give their permission unless one parent is deceased, unknown, incompetent or not reasonably available, or when only one parent has legal responsibility for the care and custody of the child.

(c) In addition to the provisions for waiver contained in 46.116 of subpart A, if the IRB determines that a research protocol is designed for conditions or for a subject population for which parental or guardian permission is not a reasonable requirement to protect the subjects (for example, neglected or abused children), it may waive the consent requirements in Subpart A of this part and paragraph (b) of this section, provided an appropriate mechanism for protecting the children who will participate as subjects in the research is substituted, and provided further that the waiver is not inconsistent with federal, state or local law. The choice of an appropriate mechanism would depend upon the nature and purpose of the activities described in the protocol, the risk and anticipated benefit to the research subjects, and their age, maturity, status and condition.

(d) Permission by parents or guardians shall be documented in accordance with and to the extent required by 46.117 of Sub-

(e) When the IRB determines that assent is required, it shall also determine whether and how assent must be documented.

(52) See, for discussions of children's rights to make decisions in the research context, Ackerman, Terrence F., Moral Duties of Investigators Toward Sick Children, 3 *IRB: A Review of Human Subjects Research* No 6, page 1, June/ July 1981; Keith-Spiegel, Patricia, Children and Consent to Participate in Research, *in* Melton, G.B., Koocher, G.P. and Saks, M.J., Eds, *Children's Competence to Consent*, New York, Plenum Press, 1983; Schoeman, Ferdinand, Children's Competence and Children's Rights, 4 *IRB: A Review of Human Subjects Research* No. 6, page 1, June/July 1982; Weithorn, Lois, Children's Capacities to Decide About Participation in Research, 5 *IRB: A Review of Human Subjects Research* No 2, page 1, March/ April 1983; Gaylin, Willard, and Macklin, Ruth, eds., *Who Speaks for the Child? The Problem of Proxy Consent*, New York, Plenum Press, 1982; Pence, Gregory E., Children's Dissent to Research: A Minor Matter? 2 *IRB: A Review of Human Subjects Research* No 10, page 1, December, 1980; Schwartz, A. Herbert, Children's Concepts of Research Hospitalization, 287 *N E J Med* 589, 1972.

(53) See, e.g., Levine, Robert J., The Nature and Definition of Informed Consent in Various Research Settings, in The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, *The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research*,

Appendix I at page 3-6, DHEW Publication No. (OS) 78-0013, Washington, D.C.

(54) For a further discussion of a minor's right to consent to medical care, see Holder, Angela R., *Legal Issues in Pediatrics and Adolescent Medicine*, 2nd ed, New Haven, Yale University Press 1985, Chapter 5; Holder, Angela R., Minors' Rights to Consent to Medical Care, 257 *JAMA* 3400, 1987; Holder, Angela R., Disclosure and Consent Problems in Pediatrics, 16 *Law, Medicine and Health Care* 219, 1988; Wadlington, Walter J., Minors and Health Care: The Age of Consent, 11 *Osgood Hall L J* 115, 1973; Pilpel, Harriet F., Minors' Rights to Medical Care, 26 *Albany L R* 462, 1972; Munson, Carol F., Toward A Standard of Informed Consent by the Adolescent in Medical Treatment Decisions, 8 *Dickenson L R* 431, 1981; Ewald, Linda Sorenson, Medical Decisionmaking for Children: An Analysis of Competing Interests, 25 *St. Louis Law J* 682, 1982.

(55) E.g., Herceg-Baron, Roberta, Parental Consent and Family Planning Research Involving Minors, 3 *IRB: A Review of Human Subjects Research* No 9, page 5, November 1981; Holder, Angela R., Can Teenagers Participate in Research Without Parental Consent? 3 *IRB: A Review of Human Subjects Research* No 2, page 5, February, 1981; Holder, Angela R., Teenagers and Questionnaire Research, 5 *IRB: A Review of Human Subjects Research*, No 3, page 4, May/June, 1983; Levine, Carol, Teenagers, Research and Family Involvement, 3 *IRB: A Review of Human Subjects Research* No 9, page 8, November 1981.

(56) 45 *CFR*, Part 46, Section 408

(c) In addition to the provisions for waiver contained in 46.116 of subpart A, if the IRB determines that a research protocol is designed for conditions or for a subject population for which parental or guardian permission is not a reasonable requirement to protect the subjects (for example, neglected or abused children), it may waive the consent requirements in Subpart A of this part and paragraph (b) of this section, provided an appropriate mechanism for protecting the children who will participate as subjects in the research is substituted, and provided further that the waiver is not inconsistent with federal, state or local law. The choice of an appropriate mechanism would depend upon the nature and purpose of the activities described in the protocol, the risk and anticipated benefit to the research subjects, and their age, maturity, status and condition.

(57) For a discussion of the need for research on why adolescents do not use contraceptives, see National Academy of Sciences, *Risking the Future: Adolescent Sexuality, Pregnancy and Childbearing*, Washington, National Academy Press, 1987, at pages 248-9.

(58) Department of Health, Education and Welfare, Proposed Regulations on Research Involving Children, 43 *Fed Reg* 31791-31972, July 21, 1978.

(59) 45 *C.F.R.* Section 46.101 (b) (1) 1986:

> ...Research activities in which the only involvement of human subjects will be in one or more of the following categories are exempt from these regulations unless the research is covered by other subparts of this part:
>
> (1) Research conducted in established educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or on the comparison among instructional techniques, curricula, or classroom management methods.
>
> (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement) if information taken from these sources is recorded in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects...

(60) For an excellent and detailed study of this question, see DuVal, Benjamin S., Educational Research and the Protection of Human Subjects, 1977 *American Bar Foundation* Journal 477, 1977.

(61) See generally, Bersoff, Donald N., Children as Participants in Psychoeducational Assessment, *in* Melton, Gary B., Koocher, Gerald P. and Saks, Michael J., editors, *Children's Competence to Consent*, New York, Plenum Press, 1983; Bersoff, Donald N., Regarding Psychologists Testily: Legal Regulation of Psychological Assessment in the Public Schools, 39 *Maryland Law Rev* 27, 1979.

(62) See Sheerer, Charles W. and Roston, Ronald A., Some Legal and Psychological Concerns about Personality Testing in Public

Schools, 30 Fed Bar J 111, Spring, 1971. For an example of identification from an "anonymous" questionnaire, see Prego v. New York City, 141 Misc 2nd 709, NY 1988, aff'd 147 AD 2d 165 NY AS 2nd Dept 1989. In that case, an extern participated in "anonymous" HIV testing in the hospital in which she worked, but when her test was positive could be identified because she was the only subject in the test who had been born in Argentina.

(63) See for example, Kirp, David L., Schools as Sorters, 121 U Pa Law Rev 705, 1973; Lau v. Nichols, 412 US 938, 1973.

(64) E.g., Tinker v. Des Moines School District, 393 US 503, 1969.

(65) Merriken v. Cressman, 364 F Supp 913, DC Pa 1973.

(66) See, e.g., Final Regulations Amending Basic HHS Policy for the Protection of Human Research Subjects, 46 Fed Reg pp 8367-8, January 26, 1981.

(67) Education for All Handicapped Children Act, 20 U.S.C. Sections 1401-1461, PL 94-142.

(68) See, e.g., Larry P. v. Riles, 343 F Supp 1306, DC Cal 1972; Hoffman v. Board of Education of the City of New York, 410 NYS 2d 99, NY 1978; Hobson v. Hanson, 408 F 2d 175, CA DC 1969.

(69)See, e.g., Benbow and Stanley, Sex Differences in Mathematical Reasoning Ability: More Facts, 222 Science 1029, 1983.

(70) e.g., Ware v. Valley Stream High School Dist., 1989 WL 153177, NY 1989.

(71) E.g., Medeiros v. Kiyosaki, 478 P 2d 314, Hawaii 1970;

Valent v. New Jersey State Board of Education, 274 A 2d 832, NJ 1971.

(72) Nicholson, Richard H., *Medical Research with Children: Ethics, Law and Practice*, New York, Oxford University Press 1986, at pages 57-60.

(73) See also, Weithorn, Lois A., Children's Capacities to Decide about Participation in Research, 5 *IRB: A Review of Human Subjects Research* No 2, Page 1, March/April 1983; Schoeman, Ferdinand, Children's Competence and Children's Rights, 4 *IRB: A Review of Human Subjects Research* No 6, page 1, June/July 1982.

(74) Holder, Angela R., Teenagers and Questionnaire Research, 5 *IRB: A Review of Human Subjects Research* No 3, page 4, May/June 1983; Levine, Carol, Teenagers, Research and Family Involvement, 3 *IRB: A Review of Human Subjects Research* No 9, page 8, November, 1981.

(75) E.g., In re Owen, 295 NE 3d 455, Illinois 1973; Nelson v. Heyne, 491 F 2d 352, 491 F 2d 352, CCA 7, 1974, *cert den* 417 US 976, 1974; Milonas v. Williams, 691 F 2d 931, CCA 10, 1982.

(76) In re Sadleir, 94 P 2d 161, Utah, 1939; In re D, 290 NYS 2d 935, NY 1968; Wansley v. Slayton, 487 F 2d 90, CCA 4, 1973.

(77) Levine, *supra* at 1, at pages 172-175.

(78) The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, *Research Involving Prisoners: Report and Recommendations*, DHEW Publication No (OS) 76-131, Appendix, DHEW Publication No (OS) 76-132, Washington, 1976.

(79) 45 *CFR* 46, Subpart C.

(80) See, for examples, In re Aline D., 536 P 2d 65, Cal 1975; In re Carrie W., 152 Cal Rptr 690, Cal 1979.

(81) 45 *CFR* 46, Subpart D, Section 46.409.

(a) Children who are wards of the state or any other agency, institution or entity can be included in research approved under 46.406 or 46.407 only if such research is:

(1) Related to their status as wards; or

(2) Conducted in schools, camps, hospitals, institutions, or similar settings in which the majority of children involved as subjects are not wards.

(b) If the research is approved under paragraph (a) of this section, the IRB shall require appointment of an advocate for each child who is a ward, in addition to any other individual acting on behalf of the child as guardian or in loco parentis. One individual may serve as advocate for more than one child. The advocate shall be an individual who has the background and experience to act in, and agrees to act in, the best interests of the child for the duration of the child's participation in the research and who is not associated in any way (except in the role as advocate or member of the IRB) with the research, the investigator(s) or the guardian organization.

(82) Personal communication, Sylvia Lavietes, M.S.W., Director of Pediatric Social Services, Yale-New Haven Hospital, New Haven, Connecticut, April 24, 1990.

(83) Holder, Angela R., Can Teenagers Participate in Research without Parental Consent? 3 *IRB: A Review of Human Subjects*

Research No 2, page 5, February, 1981; Ewald, Linda Sorenson, Medical Decision-making for Childre: An Analysis of Competing Interests, 25 *St Louis Law J* 689, 1982.

(84) One area of sincere dispute among health care professionals who take care of children and adolescents is an adolescent's right to confidentiality as to his or her parents in the face of a positive HIV test. (See statutes on this point cited in Gittler, et. als.) While there are statutory prohibitions against divulging to anyone, including parents, the existence of venereal disease, one does not normally die of gonorrhea or syphilis. Are the psychosocial aspects of being infected with a fatal disease sufficiently different from those of other diseases so that confidentiality from parents of medical information may be overridden? It may be that HIV infection, ARC or AIDS may eventually be perceived as more akin to leukemia than to gonorrhea. It is difficult to imagine a pediatric oncologist agreeing with an adolescent that she will not tell the adolescent's parents that he has leukemia. Interestingly enough, in the plethora of legal writing about AIDS, this point seems never to have been discussed in a legal or medical journal.

(85) Editorial, Drug Testing in Children: FDA Regulations, 43 *Pediatrics* 463, March 1969.

(86) Neither the associate director of the Yale University School of Medicine's Human Subjects Committee nor the author, who has been the lawyer on that committee since 1975, can find a single instance of a submission of a research protocol to our IRB in which a researcher *proposed* the use of placebos with any minor

patient. Whether the researchers do not wish to subject young people to placebos or they think the committee would disapprove the protocol, so they might as well not bother to try to involve adolescents in placebo controlled trials, is hard to determine.

(87) See, e.g., In re Hamilton, 657 SW 2d 425, Tenn 1983; In the Interest of E.G., 161 Ill App 3d 765, 113 Ill Dec 477, 515 NE 2d 286, 1987.

(88) See, e.g., In re Custody of a Minor, 379 NE 2d 1053, 393 NE 2d 836, Mass 1979; In re Hamilton, 657 SW 2d 425, Tenn 1983; In re Willman, 24 Ohio App 3d 191, 493 NE 2d 1380, 1986.

(89) 45 *CFR* Subpart A, Section 46.116. See also, Holder, Angela R., Can a Court Order Participation in Research? 9 *IRB: A Review of Human Subjects Research* No. 4, page 8, July/August 1987.

(90) Levine, *supra* at 1, at page 269.

(91) See, for examples of books on this topic, Melton, Gary B., Koocher, Gerald P., Saks, Michael J., *Children's Competence to Consent* New York, Plenum Press, 1983; Morrissey, James M., Hofmann, Adele D., and Thrope, Jeffrey C., *Consent and Confidentiality in the Health Care of Children and Adolscents*, New York, The Free Press, 1986.

(92) For an excellent, if somewhat outdated, discussion of the problems inherent in ability-grouping ("tracking") in schools,

particularly in high schools, see Sorgen, Michael S., Kaplan, William A. Duffy, Patrick S., and Margolin, Ephraim, *State, School and Family: Cases and Materials on Law and Education*, 2nd Edition, New York, Matthew Bender and Co., 1979, at Chapter 11.

(93) See, e,g, Holder, Angela R., *Legal Issues in Pediatrics and Adolescent Medicine*, *supra* at 54, at pages 142-145.

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Critical Evaluation of Comprehensive Multi-Service Delivery Systems for Adolescents: A Framework for Evaluation of Effectiveness and A Feasibility Analysis

Background Paper for United States Congress
Office of Technology Assessment's
Adolescent Health Project

Prepared Under Contract to the Carnegie
Council on Adolescent Development

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Recently, there has been increasing societal concern about the unmet needs of America's youth. For policies to best meet these needs, it is important to know which service delivery models are most successful at preventing adverse outcomes. Comprehensive service delivery systems for adolescents provide coordinated physical health, mental health, social welfare, legal, drug and alcohol, health education and other services by consolidating multiple services within a single agency or institution, or by using a single entry point to provide access to multiple systems.

However, published evaluation of comprehensive services for adolescents are rare. With few exceptions (notably Earls, 1988 and Kirby, 1989,) evaluation studies tend to be either qualitative or categorical in nature. Even those studies that quantify outcomes have tended not to examine the influence of organizational components on successful service delivery. On the other hand, decades of experience in the provision of comprehensive services for teens may be available in the "fugitive" literature (i.e., internal program evaluations, published annual reports, and submissions to funding agencies.) This paper will briefly review the existing published literature, propose a framework for evaluation of comprehensive service delivery systems for teens, and assess the feasibility of obtaining and analyzing unpublished program materials.

Adolescent Services

The history of comprehensive service delivery systems development for adolescents is complex. In the 1960's providers and politicians began to talk about the psychosocial and behavioral "new morbidities" of childhood (Haggarty, 1968). Office of Economic Opportunity (OEO) Neighborhood Health Centers, designed to increase access, and provide comprehensive coordinated services and community accountability (DeFriese, 1989) also blossomed at this time. And the "Free" Clinic student health movement of the late 1960's served as a starting point for some community based adolescent services (e.g., The Door)(Inside the Door, 1989.) School health was also changing, moving from the early 1900's model of screening for and prevention of infectious diseases towards a more comprehensive model of services. The first school based clinic opened in 1970. Today, there are more than 160 clinics in operation, in middle schools as well as high schools, and in rural areas as well as in inner cities (CPO, 1989).

In the 1970's and 80's, a growing awareness of adolescent's need for access to health care, the emergence of adolescent medicine as a field, and a commitment by

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government and private philanthropy to expand services for underserved populations, led to a variety of service initiatives for teens. From awareness that teen's health status (alone) was not improving (Brown, 1979) public attention has increasingly focused upon children living in poverty, accidental injury, depression and violence, drug use, unintended early pregnancy (Turning Points, 1989), the high rates of school failure and resultant marginal employability of many of America's youth (Youth and America's Future, 1989; The Common Good, 1989) and, most recently, the risks of AIDS (Kirby, 1989). As many as 25% of 10-17 year old teens are now believed to be at high risk for school failure, deliquency, early unprotected sexual intercourse, and substance abuse (Dryfoos, 1987).

Health services play a central role in reaching teens at risk. Health needs are frequently acute, short term, and less ambiguous than social and behavioral needs. Because of this, teens often approach services with non-threatening, cognitively benign health complaints. However, this initial contact between providers and teens may allow providers to address the less acute yet more serious problems of many adolescents.

For adolescents, however, health and other services are often fragmented. Categorical funding programs and interagency competition may pose substantial barriers to coordination of services (Resnick, 1988). Similarly, traditional fee-for-service health care may not be practical

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for adolescents who are functionally (if not actually) uninsured or underinsured (Newacheck, 1989).

Competing priorities for other basic needs make it especially difficult for poor communities to provide or poor families to benefit from health or social programs that do exist. Furthermore, many existing school, health and social service programs do not seem able to respond to today's adolescent's needs (Schorr). Teens from disadvantaged groups have higher rates of preventable illness, and low rates of service use (DHHS 1986). Most adolescents require services (i.e., preventive, ambulatory, or mental health) that are not reimbursed by most health insurance. Many of the multiservice systems we will consider here were designed specifically to address the health and other needs of this less advantaged segment of our population.

Evaluations of comprehensive delivery systems

Few evaluations of comprehensive services for adolescents have been published in the scientific literature. Most writings describing the organization of adolescent services are descriptive (Hein, 1988; others,) or theoretical (Baumrind, 1987; Irwin and Millstein, 1986,) or address only specific, categorical risky behaviors (Randall and Bruvold, 1988; Hayes, 1987). Recently, however, attention has also been focused on evaluation of certain comprehensive service models.

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Model I: The Robert Wood Johnson Foundation's Consolidation of Services for High-Risk Adolescents Program (also known as the High Risk Young People's Program, HRYPP) was designed to create system level changes in the provision of services for adolescents. This 1981 initiative was targeted to adolescents in communities with high rates of teen pregnancy, homicide, suicide and substance abuse. Twenty one teaching hospitals and 56 community co-sponsors received grants to consolidate service for adolescents. Some of these models were successful at reaching high risk youth; the HRYPP programs were successful at training adolescent providers and institutionalizing adolescent services (Lear, 1989). However, these programs were less successful than had been hoped at reducing risky behaviors, improving health outcomes, or actually coordinating services (Lear).

Earls, et. al. (1989) studied effectiveness of 7 of the HRYP programs compared to 3 comparison sites not offering special services to adolescents. Criteria included utilization by high risk youths, provision of comprehensive services and improved health outcomes. This study used two-wave survey interviews and medical record review. Patients surveys found that these clinics served mostly female teens from the local community (see also Schiffman, 1988). Nearly 2/3rd of teens surveyed reported lifestyle or behavioral problems; and these high-risk teens were more likely to use services in funded sites. At HRYPP sites, adolescents were

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more likely to inform providers about psychosocial problems, and the clinics were more likely to document these issues in charts, reflecting provider attention to these needs. No change in levels of risk-taking behaviors were found in the populations served by either HRYPP or comparison clinics.

Model II: School based services. The Center for Population Options (CPO) defines comprehensive school-based health clinics as: located on school campuses; staffed by health professionals trained in working with teenagers; and able to provide services at nominal or no charge. These clinics often are designed to serve low-income youth with limited access to other sources of health care.

In 1984, Kirby et. al. (1989) evaluated six clinics using criteria including: utilization of clinic services; use of other medical services; and clinic effect on absenteeism, illegal drug use, alcohol use, cigarette smoking, unprotected sexual intercourse, contraceptive use, and prevention of unintended pregnancies. This study used interviews, chart review, student surveys and birth records data. At 4 sites, comparison schools were evaluated; at 2, historical controls were used. Utilization was uniformly high. Specific types of services used and adolescents' motivations for using school based services are also reported. Risk-taking behaviors were surveyed, however, the authors do not attempt to attribute differences in these behaviors to the presence or absence of SBHCs.

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Earlier evaluations of SBHC's have primarily focused on needs assessment, utilization and adolescent sexuality issues. In general, services usually reach over 75% of in-school teens (Dryfoos, 1988). In St. Paul, clinic users were more likely to continue contraceptive use, and parenting teens were less likely to drop out of school (American School Health Association, 1988.) Zabin (1986), in Baltimore, controlling for school-linked outreach and reproductive health services found that pregnancy rated declined in the experimental schools. Separate uncontrolled studies in Texas and Minnesota have also shown increased contraceptive use and fewer pregnancies among students at schools with SBHC's (Kirby,1989). In Kansas City a drop in substance use rates was reported (Dryfoos, 1988b). In New York City, students and parents reported improved access to services, greater knowledge and ability to provide self-care, and improved school attendance (ASHA). Brindis et al (1987, 1988) have also reported formative evaluation of 8 clinics in California, and Stout (Stout, J, Univ of Washington, personal comm.) has begun an evaluation of 17 school based clinics in Oregon.

Other models for adolescent service delivery have been described or theorized. These include free-standing multiservice centers (e.g., The Door, in New York, or Bridge over Troubled Waters, in Boston;) Health Maintenance Organization and traditional medical practice based models, and others (Hein, 1989). However, because of the complexity of comprehensive service delivery models and their environments, it is important to think about systems level evaluation of service organizations and not just individual teen's health outcomes in assessing their effectiveness.

Factors which might be expected to influence the impact of comprehensive programs are: physical access to teen populations; removal of financial barriers; confidentiality; presence of providers with specific training in the care of adolescents; presence of multidisciplinary services and providers in a single setting; strong and consistent program leadership; a systematic approach to needs assessment; consolidation of services with single-site access; and integration of adolescent health services into community-based services (Klein, in press).

These interaction between communities and their programs revolve around the fundamental issue: What program strategies produce the greatest benefits for adolescents? Methodologically, this question is best studied through an information synthesis, or meta-analysis. Research questions to be answered include:

1. In what specific ways does the organization of adolescent service delivery systems affect their productivity and effectiveness?

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2. To what extent do differences in the population at risk (target population) affect the service delivery system components, program services delivered, and health outcomes?

3. Are certain types of comprehensive service systems more likely to lead to successes in other service delivery system components, program services delivered, or health outcomes, and, are these effects different when stratified by subgroups of the population at risk?

4. How do school-based services differ from free standing multi-service centers in other service delivery system components, program services delivered, or health outcomes, and, are these effects different when stratified by subgroups of the population at risk?

Answers to the above questions will make it possible to generate a set of recommendations concerning key elements of comprehensive services that are important for achieving health and social goals. The availability and organization of health services affect teen's ability to use them, and may also effect adolescent's modifiable risky behaviors (Irwin and Millstein, 1986; Tonkin, 1987); this research attempts to quantify the impact of some of these factors.

To study these questions, we have developed a typology to describe adolescent comprehensive service delivery system components and outcomes. This is summarized below:

FRAMEWORK FOR EVALUATION

POPULATIONS AT RISK

SYSTEMS	SERVICES	OUTCOMES
demographics	types of services	effects on clients
scope	accessability and appropriateness	effects on agencies
org. type	utilization of svcs.	effect on systems
personnel		effect on the public
financing		
eval. methods		

Typology

Population at risk defines those adolescents eligible for services. It encompasses demographic characteristics of the target populations for particular service programs (e.g., age, race or ethnicity, gender.) System factors are variables that affect or facilitate adolescents actually receiving services. They are not services themselves, but are the infrastructure components of service delivery (e.g., personnel, financing, organizations and institutions.) Services are a measure of the therapeutic interactions received; they are a sign of the system in place, reflecting both capacity, and who actually gave what to whom (e.g., availability of counselling, utilization of job training programs.) Outcomes are measures of adolescents knowledge, attitudes and behaviors with regard to health status and riskiness. Outcome domains also define effects on providers, agencies and larger systems. (Please see Appendix A for a complete listing of descriptive and evaluation terms and Appendix B for a schematic view of the matrix of questions possible and an example of the sub-questions which will be generated from the evaluation typology.)

Components within typology

We have defined adolescent service delivery and evaluation terms both conceptually and empirically to serve as the basis for the above typology. This initially involved a priori description of components of systems, services and outcomes that "should" be involved in delivery of comprehensive services to adolescents and therefore "should" be measured. We convened a local panel of experts (as the Triangle Area Adolescent Health Services Research Working Group, see Appendix C for group membership) and have modified the terms based on this groups' review and feedback. Additional modifications were done using information provided by key informants and written material from existing programs for teens which have been obtained during the current feasibility study.

Feasibility

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We have proposed, and, for this contract, been asked to consider the feasibility of studying effectiveness of comprehensive services for adolescents by meta-analysis of unpublished program materials. In order to do so, several questions must be addressed.

1. Will programs and/or funding agencies make unpublished descriptive and evaluation material available for this research?

2. Does this material contain sufficient detail to allow adequate coding of system, service and outcome and risk variables?

3. Can a national census of programs be identified and sampled?

1. The answer to question #1 is yes; unpublished descriptive and evaluation material is readily available from a variety of sources. During this preliminary study, we have received assurances of support from various individuals and organizations key to adolescent services delivery. Many have provided sample of documents that would be used in the full scale evaluation, and have offered to work with their organizations on our behalf. The latter include the Society for Adolescent Medicine, the School Health Committee of the American Academy of Pediatrics (AAP), the AMA Adolescent Health Initiative, the National

Association of State Boards of Education, the American School Health Association, the Department of Health and Human Services Office of Maternal and Child Health and others.

Several collections of materials and datasets have also been offered, including data from the Center for Population Options SBHC Support Center, AMA Innovative Programs Award nomination forms, and complete or partial state-level evaluations of school-based services in N.J., Oregon, and California. Some national philanthropies with adolescent services programs have been willing to share some of their records (e.g., WK Kellogg); others have been able to provide more limited amounts of descriptive data to date (e.g., Robert Wood Johnson.) As our request often will need to go to Foundation Executives or Boards, we have deferred approaching other Foundations pending development of final data instruments and data collection protocol.

We were, however, able to examine samples of reporting forms used for several foundation initiatives. Individually, several programs have shared copies of these forms, and others have indicated their willingness to supply us with comparable data directly. In no case have individual service delivery organizations refused our request for access to documents.

2. Coding detail is good. In general, several data sources contain sufficient depth of material for coding

descriptive and evaluative terms. Thus, the answer to question #2 is a qualified yes. We have reviewed in depth unpublished material from 14 different program's obtained from 8 different sources. These included 5 AMA nomination forms (including data on one HRYPP site, one Office of Adolescent Pregnancy Prevention program, and three other programs;) 2 Kellogg HP/DP programs (one conducted by the Door); two CPO SBHCC sites; two NJ State Dept. of Human Services Service Centers; one RWJ school-based clinic; and 2 local (North Carolina) projects, one a school-linked, and one a free-standing program. Additionally, we visited The Door, an exemplary urban program in New York City, and several versions of their written materials were reviewed to assess the comprehensiveness, validity and accuracy of our classification scheme. Preliminary evaluation of the operational use of our typology suggests that our approach has face validity in describing comprehensive adolescent services.

All sources of descriptive material reviewed gave sufficient information to determine whether comprehensive services are provided and to code for basic system and services components. Depending on the source of materials, the purpose of reporting and individual programs' evaluation priorities, considerable variation occurs in the data available from particular programs and sources. Combining information from multiple sources appears to strengthen the reliability of descriptors, and generally provides more critical assessment, however, many programs will probably have to be contacted directly either to verify or to obtain certain information. For example, complex organizations with multiple funding streams (like the Door) will probably not reveal their entire personnel structure or budget in any single external document.

Materials obtained directly from programs and from program clearinghouses generally contain sufficient detail for coding; many from funding and or other less specific sources (e.g., AMA) do not. We found it easiest to obtain material directly from programs, thus these sources should be sought when developing each programs' description. However, combining information from several sources strengthens the data and often provide critical appraisal of a programs' effect. Thus, when available, multiple sources should be incorporated into data describing each program.

Inter-observer and intra-observer reliability testing using the final data collection forms will need to be assessed for a proportion of the programs reviewed. (A more complete listing of data reviewed and contacts developed in addressing questions 1 and 2 is contained in Appendix D.)

3. The answer to question #3 is yes; a National Census of comprehensive adolescent services can be constructed and sampled. The UNC Health Services Research Center has extensive experience compiling national inventories of health and human services programs targeted at special

populations. For example, a national study of remote rural primary care clinics used panels of key informants in several states to review lists of clinics serving rural populations in those states (DeFriese, et al); these lists were found to be 95-98% "complete" (Sheps, et. al.). Similar methods were used to verify the completeness of program lists in developing a national inventory of 2500 "self-care" programs for the CDC (Woomert; (DeFriese). In both cases, these inventories enabled completion of extensive national surveys of operational structures, services and target populations of these programs. These methods could also be used to construct a national census of adolescent service programs. In the remainder of this paper, we will briefly discuss how a census of adolescent programs might be developed and used to understanding the effects of different program strategies for teens.

Methodology

The search for programs for inclusion in a census of adolescent services would incorporate several sources, including published reports, programs funded by major private foundations, AMA Adolescent Health Initiative Program award nominees, and surveys of key experts, (including State and City Maternal and Child Health department contacts , Society for Adolescent Medicine leaders and adolescent medicine fellowship directors, and

American Academy of Pediatrics and National Association of State Boards of Education State Presidents.) The UNC Health Services Research Center maintains a collection of Health Promotion program materials for Adolescents; additionally, the UNC Center for Early Adolescence maintains a substantial reference archive of unpublished descriptions of educational and social service programs for teens.

A three stage survey process will be used to collect data about programs. Initially, we will validate that the program should be included in a census of comprehensive service systems for adolescents through document and/or telephone screening. This will be followed by a brief mail survey, to obtain simple descriptive information (i.e., sponsorship, location, size, services, etc.) for each program and to request their participation in more extensive document review. After review of the number of programs identified and the quality of material available, we will sample the programs. A questionnaire and requests for detailed descriptive and evaluation materials will be sent, with phone or interview follow-up used as needed.

The analysis will proceed in the following steps: (1) We will define criteria for inclusion of a study or research report within a specific analysis (e.g., do they ask the same questions, report on comparable subjects, interventions or outcomes? (2) After operationalization and testing of the terms in our typology, we will code each study for inclusion in the database. (3) Our analysis will focus initially on descriptive characteristics of adolescent service programs. This will enable us to reduce the typology to a discrete number of models based on size, target populations and key organizational components. (4) A second stage of analysis will focus on variation within and across categories of variables (e.g., description of different types of school based clinics, comparison of school based clinics with other types of multi-service clinics; or, comparison of comprehensive models versus coordinated ones.) And, (5) appropriate comparisons will focus on those characteristics of adolescent service delivery systems and services that account for these variations in effects (e.g., analysis of education agencies versus health agencies as administrative "lead agency" in school based services.)

Remaining tasks

Evaluation of adolescent services is difficult, because of the discontinuity between societal concerns (for teens) and our scientific ability to measure outcomes. Obviously, the full matrix of sub-questions and analyses in Appendix C can not be answered by data collected from these programs, however, we believe there is sufficient data, and sufficient variation between programs, for meaningful summative analysis of system, service, outcome and risk variables.

We have defined adolescent service delivery and evaluation, and both preliminary evaluation and expert review of these definitions suggests that our approach yields a valid set of descriptor terms. Obviously, many details of the proposed methodology will need to be specified, including operationalization of the terms, design and testing of coding instruments, and development of the census, sampling criteria and analysis plans.

In this paper, we have addressed three tasks in assessing comprehensive delivery systems for adolescents. We have developed a typology for meta-analysis of the effectiveness of comprehensive delivery systems for adolescents. We have demonstrated that "fugitive" literature is available, have examined sample data, and proposed methods for obtaining this information. And, finally, we have reviewed the existing literature, and have demonstrated that the proposed meta-analyses of extant experience providing comprehensive services to adolescents will help fill an information gap in our knowledge of the effects, and the effectiveness, of these services. These findings will be of value in formulating policy options for future efforts to provide comprehensive services to adolescents, and will add greater confidence to decision-making for projects to address adolescents health and social needs.

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Background Paper for the United States Congress Office of Technology Assessment's Adolescent Health Project

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Gordon H. DeFriese, Ph.D.

February, 1990

APPENDIX A

DESCRIPTIVE TYPOLOGY: FRAMEWORK FOR ANALYSIS OF COMPREHENSIVE SERVICES FOR ADOLESCENTS

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FRAMEWORK FOR EVALUATION OF SERVICE DELIVERY SYSTEMS

POPULATIONS AT RISK

SYSTEMS

- demographics
- scope
- organization type
- personnel
- financing
- evaluation methods

SERVICES

- types of services offered
- accessability and appropriateness
- utilization of services

OUTCOMES

- Effects on clients
- Effects on agencies
- Effects on systems
- Effects on the public

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Populations at risk

- Age
- Ethnicity
- Gender
- Geography
- by target behaviors
- by connectedness
  - to family
  - to school

Systems

I. Demographics

1. community type
   - rural
   - urban
   - suburban

2. site

a. number
   - single
   - multiple
   - networks

b. type:
   - schools
     - high
     - middle
     - alternative
   - school "linked"
   - free-standing "community" based
   - other agency
   - hospital
   - health department
   - private practice
   - HMO
   - correctional agency

3. size
   - number clients served
   - number providers
   - number volunteers
   - clients served per provider

II. Scope

1. Service goals
   - coordination
   - comprehensiveness

2. Population eligibility
   - unspecified
   - targets
     - by group membership (e.g., minority)
     - by risky behaviors
     - geography

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    - age
    - payer
  - eligibility criteria
    - strict
    - relaxed

3. Confidentialty
   - degree
     - absolute
     - environmentally difficult
     - minimal
   - legal impact
     - state laws re service provision

4. Convenience
   - traditional hours
   - extended hours
   - accessable location

III. Organization type

1. Organizational sponsorship
   - health services delivery organization
   - health related agency
   - school or other educational organization
   - social services agency
   - other

2. Centrality
   - direct vs. indirect health goals
   - direct vs. indirect social goals
   - does the system care about its variation in action for each client

3. Complexity
   - Does the system have other goals besides individual outcomes?
   - If yes, are they re:
     - financing
     - training providers
     - other

4. Duration and Durability
   - activity or intervention - is this a new activity for an established program, or is this program truly new
   - program stage
     - pilot
     - model
     - institutionalized
   - initiation
   - sponsorship
   - leadership
   - historical mission of organization
   - reputation and "image"
   - availability over time / programmatic longevity

IV. Personnel

1. types
   - professional
   - non-professional / lay
   - volunteers
   - division of authority

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2. staffing (defines capacity, not services)
    - MD
    - RN
    - social worker
    - mental health
    - trainees
    - NP
    - specialists
    - legal
    - vocational
    - counsellor
    - educator
    - recreational
    - clients
    - dentists/hygenists

3. relationships
    - indigenous to clients
    - role models to clients
    - coordinated

4. experience
    - years of experience
    - training
        - in facility
        - in specific model
    - stablity

V. Financing

1. predominant sources of funds

a. by type
b. by percent
    - grants
        - government
            - (specify programs)
        - foundations
            - (specify programs)
    - medicaid
    - state or city government
    - philanthropy

2. Expenditures
    - total cost of services / annual budget
    - cost per encounter
    - cost per client served

3. costs
    - % free care
    - % fee-for service
    - high vs. low out-of-pocket expenses for clients
    - affect on confidentiality

VI. Evaluation Methods

- type
    - formative
    - summative
        - able to generate denominator data
    - attempted only
    - none
- process (see complete list of data sources and quality)
    - interviews   surveys   document review
- location
    - internal
    - external
- criteria

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    - established
    - consistent
  - purposes
    - policy
    - management
    - providers
    - clients
  - biases and barriers to evaluation
    - data collection
    - record keeping
    - participant selection
    - biased controls
    - feedback modification
    - status rivalry

Services

I. types of services offered

- outreach
  - professional
  - peer
- needs assessments
  - population
  - individual
  - ongoing
  - static
  - responses to misclassifications
- health care / comprehensive
  - preventive
  - primary care
  - acute services
  - specialty services
  - lab services
  - pharmacy
  - activity focused groups with (health) agendas
- health care / categorical
  - dental
  - stds
  - drugs
  - alcohol
  - pregnancy testing
  - family planning
  - prenatal care
  - adoption
  - rehab, PT/OT
- counselling
  - psychiatric
  - other mental health
  - social work
  - religious
- social services
  - housing
  - transportation
- educational
  - health education
  - special education
  - vocational training
  - nutrition education
- other

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- food
- legal aid
- day care
- recreation
- mentorship

II. Accessability and appropriateness of services

1. Teen Acceptance of Services
    - in balance with teen's view of world
        - (Adolescent developmental perspective defined as in Bronfenbrenner social ecologic model.)
    - incorporation of social environments
        - parents
        - peers
        - schools
        - others
    - incorporation of self perceptions
        - in needs assessment
        - in service provision

2. Coordination
    - variation between individual clients
    - referral paterns
        - traditional staff driven
        - client driven/centered
        - needs assessment protocol
        - case managed services
            - on site
            - off site

3. Continuity
    - of patients
    - of providers

III. Utilization

a. clients served (by client risk group / control variables)
b. frequency of use
- by risk/control group
- kinds of service used
- is there monitoring and feedback of utilization data

Outcomes

I. Effect on persons served

1. Knowledge
    - of available services
    - of preventive and risky behaviors

2. Attitudes towards
    - facility / service
        - motivation to use services
        - access
        - comprehensiveness
    - Satisfaction
        - encounter related
        - user surveys
        - population surveys

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- healthy/risky behaviors
  - health risk appraisals
- health status
- functional status
- life goals

3. Health status and behavior changes
   - number of adverse outcomes
     - pregnancy and repeat pregnancy
     - contraceptive use
     - drug and alcohol use
     - stds
     - smoking
     - abuse
     - violence and injury
     - suicide and depression
   - healthy behaviors
     - fitness
     - prudent diet
     - exercise
     - seatbelts
   - achievement of primary health care
   - improvement in
     - school performance
       - dropout
       - graduation or GED
     - employment
     - legal trouble
     - independent living

II. Effects on agencies

- change in services
  - comprehensive
  - coordinated
- change in financing/costs
- change in staffing
- change in staff knowledge, attitude or behaviors
  - towards program
  - towards efficacy in caring for adolescents
- change/institutionalize services

III. Effect on systems

- effect on community of having an alternative setting
- community belief that programs reach teens at high risk
- political belief in prevention of "new morbidities"
- networking of providers across agencies
- dissemination of program models
  - workshops
  - publications
- changes in financing systems resource allocations
- change in funding agency

IV. Effect on the Public

- population scale measurements of client, agency and system effects
- attributable temporal/secular trend

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Additional catagories of data not directly relevant to classification of programs for adolescents but relevant to the analyses proposed:

Data Sources

- published literature
- annual reports
- reports to funding agencies
- internal program evaluations
- external program evaluation
- unpublished formal evaluation studies
- informal descriptions of program
- questionaire survey of program personnel
- personal survey of program personnel

Strength and quality of data

- published reports
  - scientifically sound design, controlled study
  - scientifically sound design, uncontrolled study
  - quasi-experimental design
  - subjective, descriptive only
    - objectivity good
    - objectivity fair or poor
    - objectivity can not be assessed
- unpublished sources
  - scientifically sound design, controlled study
  - scientifically sound design, uncontrolled study
  - quasi-experimental design
  - subjective, descriptive only
    - objectivity good
    - objectivity fair or poor
    - objectivity can not be assessed
- (Scale) Subjective strength of all data sources relating to this project

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APPENDIX B

EVALUATION MATRIX AND SAMPLE OF QUESTIONS AND SUBANALYSES

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Appendix B

Sample of Full Matrix of Evaluation Questions

risk (r)			
systems (Sy)	(r) x (Sy)		
services (Se)	(r) x (Se)	(Sy) x (Se)	
outcomes (O)	(r) x (O)	(Sy) x (O)	(Se) x (O)

Domain matrix pair questions and subanalyses will be fully specified prior to data collection to ensure accurate and adequate coding for all research questions of interest. A sample of these questions follows this page for illustrative purposes only.

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The matrix of variables allows us to pose all possible combinations of evaluation questions, and, importantly, makes it easy to identify those relationships which are assumed. Furthermore, the mathematical relationship illustrates and informs the sub-questions within each box in the matrix. A sample of the fully specified model is shown:

Relationship	Questions
$Sy = f(r)$	Does choice of target population influence the accessibility, capacity or quality of the adolescent service delivery system? a. over time b. for specific system factors
$Se = f(r)$	Does choice of target population influence the actual services delivered (e.g., did adolescent health or social services capacity or use improve, knowing no details of the system interventions?) a. etc....
:	:
:	:
:	:

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$Se = f(Sy)$

Here we are looking at how the capacity of the delivery system impacts on actual services offered and received by adolescents. These should be associated, but they may not be. Statistically, this is a matrix of Sy_x by Se_x, with services as the outcome measure and delivery system components as the independent measures.

a. Does any Sy_x influence any Se_x?
b. Does any Sy_x influence any Se_x over time?
c. Does any Sy_x influence any Se_x received by a sub-group $r_{(i)}$?
d. For each Sy_1, Sy_2...which Se_x does it influence?
e. For each Sy_1, Sy_2...which Se_x does it most influence?

:

:

:

this could be continued to include sub-groups, combinations of Sy factors, etc..

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Another kind of example details the kind of questions that will be explored in subanalyses. This sample is generated from research question #3, "Are certain types of comprehensive service systems more likely to lead to successes in other system components, service components or outcomes, and, is this effect different when stratified by subgroups of the population at risk?" Note: each questions' relationship to the evaluation matrix is also shown.

> Rationale: One of the goals of the HRYPP was to train providers to be comfortable in managing emotional, drug and alcohol, and behavioral problems common to adolescents. Surveys indicate that providers feel greater ease and efficacy (Yates, Earls). Objective correlation of their ability is not available, however, other evidence supports the beneficial effects of adolescent medicine trained providers on likelihood of follow-up (Chacko) and patient satisfaction (Litt).

$Sy_{1,2,...n} = f(Sy)$ 3a. How do specific system components (i.e., effective personnel training and retention; specifically, adolescent medicine trained MD's or NP's) affect other system components (confidentiality, financing, etc.)?

$Se = f(Sy)$ 3b. Do specific system components (i.e., effective personnel training and retention) affect services offered or used (i.e., are systems with adolescent medicine trained MD's or NP's more likely to provide contraceptive services)?

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O = f(Se) 3c. Do services offered effect certain kinds of outcomes (if contraceptive services are provided is the delivery system more likely to prevent unintended pregnancy in teens served)?

O = f(Sy)/(Se) 3d. If services offered effect certain outcomes (unintended pregnancy), is this effect modified by presence of other system factors (more skilled or experienced personnel)?

O = f(r)/(Se) 3e. If services offered effect certain outcomes,.is this effect modified by specific characteristics of the population at risk (i.e., rural populations)?

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APPENDIX C

LOCAL PANEL OF EXPERTS

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Triangle Area
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APPENDIX D

SOURCES OF DATA REVIEWED, AND FEASIBILITY OF USE IN STUDY

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American Medical Association
Department of Adolescent Health

Arthur Elster, MD, Director
Dale Blyth, PhD, Associate Director

The AMA has five to six page descriptions of programs nominated for their adolescent health congress recognition awards. Over 300 programs are included in 1988 and 1989 nominations. Approximately 25% are "intervention" programs and 50% are "prevention" programs. Data include organizational sponsorship, funding sources, date of initiation, description of the service population, clients served, staff, program goals and objectives, and evaluation (including evidence of effectiveness.) A sample of forms (n=5) included two programs nominated for their achievement in categorical interventions. Of these, one provides comprehensive services, the other is primarily categorical. Some programs included data on community or individual needs assessment and other services available either at the program site or through referral networks.

Screening of these forms will be necessary to decide which programs provide comprehensive services. Additional contact will probably be needed to verify services and system data. The AMA forms will be copied in their entirety and a set of these materials will be available at the University of North Carolina HSRC by April, 1990.

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AMA Adolescent Health Coalition

The AMA Adolescent Health Coalition, composed of 31 member organizations, will be asked to participate in development of the national census of programs serving adolescents.

* * *

The Robert Wood Johnson Foundation
Consolidation of Services for High-Risk Young People Program (HRYPP) and School Based Adolescent Health Care Program (SBHCC).

Julia Lear, PhD, Washington, D.C.
Victoria Weisfeld, Princeton, NJ

There were 91 applicants for the HRYPP and 20 grants were awarded in conjunction with 56 community agencies. Foundation reporting for the HRYPP consisted of yearly statements of goals and plans and quarterly management information reports of staffing, services offered, utilization volume by age, sex and race/ethnicity, staff training, facilities, hours, marketing/outreach, and inter- and intra-organizational relations.

The SBHCC program covers 24 sites in cities with more than 100,000 people. Additionally, under different granting programs, the Foundation has made grants to other sites for similar activities. More extensive reporting is maintained by the SBHCC programs than the HRYPP. These include all of the information collected for the HRYPP, and specific service and provider utilization data, amount of time spent

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per visit, and alcohol/drug, mental health and sexual activity related risk assessments.

The Foundation has funded evaluation of these programs. The HRYPP evaluation is briefly reviewed in this contract paper. Several published articles have appeared. Characteristics of the programs system components are described, however, not in detail. The evaluation of the SBHCC program is still in progress.

The RWJ Foundation will not allow review of annual or quarterly reports, or successful grant applications. They will provide contact information and final reports for funded projects. We have not received a sample final report yet, and thus cannot comment on the quantity or quality of the information they contain. Several grant recipients were also contacted; all were willing tc share detailed information directly with us. Descriptive components of systems and services are also available from a 1983 project profile booklet. We have initiated contact with the funded evaluation units for these projects to determine whether additional organizational data might be available from their ongoing analysis of these programs.

* * *

NJ Dept. of Human Services
School-Based Comprehensive Services Program

Ed Tetelman, JD, Associate Commissioner
Neil Sternberg, Program Director,

The state has established 29 school based programs. Each service center has mandated services including health, job training, family counselling, substance abuse services, and recreation, and adds whatever else they choose. Utilization and demographics are reported monthly. Site visits also occur monthly. Aggressive central management style includes marketing plans for each of the clinical sites and has included forced change in the lead agency at 4 sites, too.

Service personnel are often contracted for in the case of medical and mental health and job training; social work and nursing services are generally employed directly. First contact is with "aggressive energetic" young workers, usually of local background. Clinics have been placed in each county and are line item budgeted at the department and legislative level.

We have an open invitation to examine in detail the existing files on all sites including successful and unsuccessful proposals. Data include: original Rfp and grants, which include program overview, budgets, coordination of existing services, accessibility in or near school and after hours, staffing, etc. Funding eligibility required a broad coalition of local voluntary and public agencies in cooperation with the school district. The lead agency must be designated but is not specified. Applicants were chosen based on community level needs (note: see p. 7-8 of RFP). A local advisory board is mandated.

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Program objectives are stated in measurable terms including utilization, attitudinal and (occasionally) outcome data. Explicit staffing, service delivery, organization, marketing, etc. are specified. Monthly and summary utilization data includes: demographics; academic behavior, substance abuse, depression and suicide, and juvenile justice contacts; new/old participants and results of follow-ups; group activities; recreational activities, child care, transportation, hot-line services; etc. Monthly management site visit reports are filed, identifying strengths, weaknesses, recommendations and follow-up. Service components are also graded (0 to 5 scale) monthly.

* * *

The Door
New York City

Elma Denham, Julie Glover, Associate Directors
Michelle White, Director of Health Center

The prototype for comprehensive multi-service centers for young people. Their primary objective is to respond to the health needs of NY teens and help adolescents achieve healthy ways of life. Those without access to other services are particularly targeted. Data collection is extensive as there are over 70 different categorical funding sources supporting the Door's programs. Utilization objectives are explicit and monitored closely using their computerized in-house client tracking system.

For example, their Comprehensive Health Services (Section 330) application specifies both capacity and use of services by 2,750 inner city adolescents in 11,340 service encounters; mental health assessments and counseling to 750 people; health promotion to 900 clients not otherwise using the health center; etc. The health center goals also include a "total person" approach to youth and dissemination of their model for comprehensiveness.

The Door has extensive external reporting requirements in part because of their designation as a health center and family planning service site. Reporting includes utilization, provider characteristics and chart review to the Bureau of Community Health Services. A family planning clinic visit record (CVR) is compiled for all patient visits The CVR contains demographics, financial data, pregnancy history, purpose of visit, medical services provided, counseling services provided, providers, contraceptive use, and involvement in AIDS risk assessment and counseling activities. Additionally, patient routing slips contain demographics, behavioral risk factors, tests performed, exams performed, counseling needs, follow-up plans, contraceptive behavior and risk, providers, services and groups used. Finally, the Health Center uses a (periodic) client questionnaire to assess waiting time, utilization over time, and client attitudes.

Outreach and follow-up at the Door is initially passive and then quite aggressive with no-shows receiving letters and calls. The discrepancy between no-shows and follow-ups and the number of new charts opened per month are used as management tools, as is a weekly waiting time report. The participation in "new persons group" and drop-out from there to first clinic visit is also followed.

Review of the general support application and program description and annual section 330 (Federal/Community Health Services Reapplication) report will allow adequate coding of all program components and health and outcome components, respectively. Actual staff and budget data are probably not accurately reflected in any single data source I reviewed, and will need to be obtained from management documents or interviews with staff. Of note, this will probably be the case with any of the extremely complex organizations.

* * *

Center for Population Options
Support Center for School-Based Health Clinics

Cindy Wacsak, Director of Research, CPO

The CPO 1989 Survey identified 150 SBHC's operated by 90 programs in 32 states. Data is available on clinic sponsorship (n=130), provision of various services (n=92), participant eligibility and percent utilization, demographics, and funding, including insurance status and operating costs.

The CPO-SBHC Support Center also has supplied us with a mailing list containing all clinics they are aware of, contact persons, type of agency, and the number of clinics coordinated by each program. An annotated list by state notes the availability of annual reports and other evaluation material available at CPO. Detailed material is available on 19 clinics with multiple reports available from several clinics several of these. Reports vary from brief research presentations to extensive annual reports. Service utilization and organizational variables are detailed in the sample of reports reviewed; needs assessment and monitoring surveys are often cited. Outcome data is usually specified but lacking denominators. The complete dataset is currently in Texas; the support center will be moved and the data available in the CPO Washington office after March 1990.

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W.K. Kellogg Foundation Health Promotion / Disease Prevention Program

UNC Health Services Research Center

Material available in the Health Service Research Center files regarding evaluation of Kellogg's HP/DP projects include descriptions of population at risk, staffing patterns, specific interventions and services, needs assessment and environmental analysis. These files also describe organizational factors, evaluation plans by type of evaluation, financial analysis, actual services provided, and actual evaluations performed with the outcomes measured (primarily participant surveys and health risk appraisals).

The evaluation measures planned for the two projects reviewed (Teen Link in Durham, NC, and The Door's Health Assistance Program) were overly ambitious. Process and program measures were easily obtained, short-term outcome measurement was troublesome, and evaluation plans were modified extensively throughout the reports reviewed. Few population or individual health status measurements were possible. Most outcomes appear to have been system and service level effects.

In all, there were 22 health promotion projects. There is some overlap, as might be expected, between these and projects funded from other sources. Sufficient material exists at the UNC HSRC for determination of whether each project is in fact based in a comprehensive service delivery setting. The breadth of material available varies across these programs. Initial coding is possible from HSRC files, however for those programs where fewer reports have been filed confirmatory information will need to be obtained directly from the programs (if they are still in existence).

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Additional Sources / Initial Contact Notes

Society for Adolescent Medicine

Letter sent; no formal organizational contact initiated to date.

Bureau of Maternal and Child Health
Department of Health and Human Services
Joanne Gephardt, RN

Between 20-25 states now have adolescent coordinators within their Maternal and Child Health divisions. We will be receiving this list as well as information about the involvement of MCH training programs in adolescent activities and state data tracking. (e.g., Massachusetts Department of Public Health tracking, Judith Gorbach; and New York State Department of Public Health, School Health Center Data known to exist from a Welfare Research, Inc. (Albany, NY) study, contact?)

Listings of "exemplary and innovative health department programs for service delivery to adolescents" will also be obtained (prepared for the Intergovernmental Health Policy Project Conference, 1985), along with any updates available at the State and Federal MCH level.

Carnegie Corporation and the Carnegie Council on Adolescent Development
Susan Millstein, PhD
?new contact

Ongoing support and advice in regard to the current study. Related contacts include Joy Dryfoos, Hastings on Hudson, New York, and Karen Hein, MD, Montefiore Medical Center, NY, and Claire Brindis, DrPH, San Francisco, CA.(Who is involved in an ongoing evaluation of 8 SBHC's in California.) Council resources include background papers and evaluation papers on existing SBHCC. Corporation involvement may also include direct funding of services.

DHHS Office of Family Life Programs (formerly Office of Adolescent Pregnancy Prevention) and other Federal Title X funded services.

Contact to be initiated with Lorraine Klerman, PhD, New Haven, CT, and Dennis McBride, PhD, Seattle, WA, regarding current and prior consultation and evaluation studies performed, the nature of data available from these projects, and estimates of the number of funded projects which also provide comprehensive services.

W.T. Grant Foundation
Robert Haggerty, MD

Letter sent; no other organizational contact initiated to date.

The Cities in Schools Project
(contact not established)

A network of 60+ comprehensive school linked service programs in 23 cities, founded in 1975 with coordinated

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training and technical assistance available through a national office in Washington, D.C.

University of Washington, Seattle.
James Stout, MD

This research team has an evaluation contract with the State of Oregon to assess the effect of 17 SBHC's. Data content not known; initial discussions held with access to data and collection of organizational information likely.

American Academy of Pediatrics

Joe Saunder, MD, Associate Exec. Director
Joseph Zanga, MD, Chair, School Health Committee

Preliminary contact established and assistance in generating census offered by AAP through their 54 chapters.

National Association of State Boards of Education

Candace Sullivan, Director of Research

Preliminary contact established and assistance in generating census offered.